



## Safety

Oversee and operate the safest aerospace system in the world, all with a culture of continuous improvement

### Expand Safety Culture

Expand the Safety Culture Campaign across FAA and industry that integrates all aspects of Safety Culture (i.e., Just Culture, Reporting Culture, Learning Culture, Flexible Culture, and Informed Culture) to improve safety performance throughout the NAS.

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#### **Initiative: Promote Positive Safety Culture**

Promote a positive safety culture that involves proactively addressing safety issues early in the development phase to alleviate the advent of critical safety hazards during National Airspace System (NAS) implementation.

#### **Activity: Establish Voluntary Safety Reporting Program**

Ensure a positive safety culture that encourages employees to provide essential safety-related information in a non-punitive environment.

#### **Target: Develop a Draft ANG Safety Guidance for Establishing Voluntary Safety Reporting Program**

Develop a draft safety guidance for establishing Voluntary Safety Reporting Program for NextGen.

#### **Target: Publish Final ANG Safety Guidance for Establishing Voluntary Safety Reporting Program**

Finalize and publish the safety guidance for establishing Voluntary Safety Reporting Program for NextGen.

#### **Activity: New Entrant Focused Research and Development**

Conduct ongoing research and development efforts to support the safe and efficient integration of Unmanned Aircraft System (UAS) into the National Airspace System (NAS).

#### **Target: Final Report for Operations Over People Means of Compliance Research Task**

FinalReportforOperationsOverPeopleMeansofComplianceResearchTask

#### **Target: Viability of an omni antenna to validate ADS-B**

Viability of an omni antenna to validate ADS-B and conduct DAA for smaller UAS unable to carry large antenna payload.

**Target: Day/Night, Light Intensity, Light Flash Rate.**

This research will determine if its possible to increase the visual conspicuity of Small Unmanned Aircraft System (sUAS) to both a manned pilot and a visual observer on the ground. A Computer based study will investigate the following variables of interest

**Target: Draft report of the diverse types of UAS data collected**

Draft report of the diverse types of UAS data collected (from both live flight testing and simulation), attached to a spreadsheet output of 1000 or more instances of flight data.

**Target: Report on the coordination level needed amongst Federal Agencies**

Report on the coordination level needed amongst Federal Agencies to conduct disaster response missions with UAS instead of manned aircraft.

**Target: Interim Performance**

Based specifications for detection and mitigation systems on and around airports.

**Target: Validate and approve the Navy/Naval Air Warfare Center (NAWC)**

ValidateandapprovetheNavy/NavalAirWarfareCenter(NAWC)TestPlanforthe FAA's UAS Engine Ingestion Test with FAA/Aircraft Certification (AIR) and FAA/NextGen (ANG)

**Target: Support stakeholder interests where Unmanned Aircraft System Traffic Management (UTM) operations are conducted**

This analysis details the updated concept related to airspace constraints to support stakeholder interests where Unmanned Aircraft System Traffic Management (UTM) operations are conducted. Use case/scenarios depict envisioned services, capabilities, and data exchanges for low altitude restrictions and advisories that support the UTM implementation activities. Results from this analysis will be used to elicit agency position for the management of restrictions & advisories applicable to UTM.

## **Optimize Information to Reduce Risk**

Transform the agency's approach to assessing and managing system safety performance through enhanced access to data and analytics, inform risk-based decision making, improve existing safety metrics, and increase system safety awareness.

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**Initiative: Surface Safety Risk Reduction**

AJI will utilize the surface safety metric to: Establish consensus among Runway Safety stakeholders on a policy to assess and quantify the risk in runway safety events. Address precursors, as well as latent risks by proactively providing event trend summaries and best practices to the field.

**Activity: ANG Support of Runway Safety Office (AJI) Initiative of Surface Safety Risk Reduction**

The Runway Incursion Reduction Program's (RIRP) objective is to continually discover, research, implement, maintain and innovate technologies that will detect the incorrect presence of an object in the Runway Safety Area and deliver a directive cue to the individual who can take corrective action.

**Target: Initiate Installation of a Runway Incursion Prevention through Situational Awareness (RIPSA) Technology**

Runway Incursion Reduction Program (RIRP) will initiate installation of a Runway Incursion Prevention through Situational Awareness (RIPSA) technology at one identified candidate test site.

**Target: Lab Demonstration and Testing of Simultaneous use of Surface Taxi Conformance Monitoring (STCM)**

Runway Incursion Reduction Program (RIRP) will conduct lab demonstration and testing of simultaneous use of Surface Taxi Conformance Monitoring (STCM) tower and flight deck prototypes.

**Target: Runway Incursion Reduction Program (RIRP) Programmatic Support**

Runway Incursion Reduction Program (RIRP) will deliver programmatic support to AJI as required for the Surface Safety Group (SSG), Data Analysis Team (DAT), and Surface Safety Initiatives Team (SSIT).

**Initiative: Aircraft Safety Assurance**

Research and Development that assesses and improves aircraft safety systems and the safe introduction of new aircraft technologies. Aircraft centric research areas include composites/materials, propulsion and fuel systems, and fire protection and detection.

**Activity: Conduct Aircraft Safety Research**

Conduct advanced materials, continued airworthiness, propulsion/fuel systems and fire safety research to ensure continued safety in the design and operation of aircraft systems.

**Target: Update metal and composite material models for engine fragment impact**

Conduct LS-DYNA Aerospace Working Group meeting with updates to industry on new impact and failure models available in LS-DYNA for metal and composite materials. Revise and update modeling guidelines and Quality Assurance test cases.

**Target: Conduct and document testing to support new and improved flammability test methods for aircraft materials in support of Notice of Proposed Rulemaking Interior Parts and Components Fire Protection for Transport Category Airplanes**

Conduct testing, in collaboration with industry partners, to refine flammability test method standards, identify and control critical test parameters, and verify global reproducibility of test methods. Document test method specifications for inclusion in the Aircraft Materials Fire Test Handbook, Revision 3.

**Target: Conduct Initial Phase of Test and Analysis of Third Fuselage Panel to Assess Emerging Metallic Structures Technology (EMST)**

Collect and present test data to demonstrate whether and how fuselage concepts utilizing Emerging Metallic Structure Technology improve damage tolerance compared to baseline fuselage structures constructed using conventional materials and processes. Collaborate with Arconic and Embraer to assess EMST using the Full-Scale Aircraft Structural Test Evaluation and Research and Structures and Materials Labs.

### **Target: Demonstrate Electric Propulsion Systems Test & Evaluation**

Utilizing the newly installed battery emulators, demonstrate the ability to test and evaluate electric propulsion systems within the POWER laboratory.

### **Target: Conduct flight tests with Ground Collision Avoidance Systems**

Conduct flight test to advance the maturity of NASA's Expandable Variable-Autonomy Architecture (EVAA) with imbedded Ground Collision Avoidance Systems (GCAS) to enable the FAA to develop certification paths for GCAS for general aviation aircraft.

### **Target: Conduct and document testing of halon-alternative agents for fire suppression in an engine nacelle**

Conduct and document testing of halon replacement agents being evaluated by airframe manufacturers for fire suppression within the engine nacelle. These tests will be in two collections, in collaboration with Boeing and Meggitt then with Airbus and Collins Aerospace, and will provide insight as to the feasibility of their adoption in this environment.

### **Target: Conduct Pre-Screening Tests of Unleaded Aviation Gasoline for Entry into the Piston Aviation Fuels Initiative (PAFI)**

Conduct pre-screening performance testing to evaluate unleaded fuel anti-detonation characteristics, operability, and effects on durability of limiting case aviation piston engines. Collaborate with AIR-670 in identifying acceptable unleaded aviation gasoline for entrance into the Piston Aviation Fuels program.

### **Target: Update Metallic Materials Properties Development and Standardization (MMPDS-17) Handbook.**

Working with industry - government consortium, update the Metallic Materials Properties Development and Standardization (MMPDS-17) handbook and database providing statistically based material allowables that comply with material strength requirements in §2X.613 for aircraft certification and continued airworthiness.

### **Target: Conduct and document initial phase of evaluation of aged structural bonds on helicopter blades**

Conduct initial testing in collaboration with industry partners and using the FAA Tech Center Structures and Materials Lab to investigate long-term behavior of adhesively bonded joints in rotorcraft applications, including aging effects, fatigue and damage tolerance.

### **Target: Reduce the Risk of Rotorcraft Loss of Control Accidents/Incidents**

Utilize helicopter simulator devices at the FAA Technical Center and industry partner flight test platforms to collect helicopter flight data and use to develop and document new safety analysis tools and metrics that address the root causes of loss of control for rotorcraft.

### **Target: Conduct Fire Extinguisher Evaluation against Lithium Battery Hazards**

Publish a report detailing results that quantify the effectiveness of various alternative fire extinguishing agents against lithium battery fires. The knowledge gained from the results of this testing will aid in the development of appropriate guidelines for these halon replacement agents for use in cargo compartments containing lithium batteries.

### **Target: Enhance DARWIN Engine Design Code to Integrate Bi-Variant Crack Growth Solutions with its Auto-modeling Capability**

Two significant advances in fracture mechanics analysis capabilities in DARWIN are the use of (1) bi-variant crack growth solutions and (2) auto-modeling. Bi-variant crack growth solutions provide improved accuracy and auto-modeling enables rapid generation of fracture models to support life and risk calculations more robustly than those inputted manually. Currently, only one or the other capability can be used but not both simultaneously. This effort will enhance DARWIN by enabling bi-variant solutions to be integrated with auto-modeling to provide users full advantage of both.

## **Initiative: Enterprise and ANG Safety Management Systems**

Conduct integrated safety assessment to determine National Airspace System (NAS) enterprise safety risk, and develop safety requirements for mitigating potential hazards and improving safety benefit of the NAS modernization.

### **Activity: Conduct Safety Risk Management**

Conduct Safety Risk Management for National Airspace System (NAS) Enterprise to support risk-based decision making.

### **Target: Launch the Hazard Enterprise Assessment Traceability Tool, Version 2.0**

Deploy fully functional Hazard Enterprise Assessment Traceability (HEAT) tool version 2.0 to support Safety Risk Management panels.

### **Target: Develop a Concept of Use for Hazard Enterprise Assessment Traceability Dashboard**

Refine the operational use cases for the executive Hazard Enterprise Assessment Traceability (HEAT) dashboard which provides backend management and governance for the Hazard Enterprise Assessment Traceability (HEAT) tool.

### **Activity: Maintain National Airspace System Enterprise Safety Handbook**

Update National Airspace System Enterprise Safety Handbook (NESH) based on lessons learned and feedback from stakeholders.

**Target: Develop a Draft for National Airspace System Enterprise Safety Handbook v3.0**

Develop a draft National Airspace System Enterprise Safety Handbook (NESH) v3.0 for stakeholder reviews and feedback.

**Target: Publish National Airspace System Enterprise Safety Handbook v3.0**

Develop and publish the National Airspace System Enterprise Safety Handbook (NESH) v3.0.

**Initiative: Enterprise Cyber Support for National Airspace System**

Provide cyber testing capability to improve the cybersecurity posture of the FAA systems integrity, confidentiality, and availability.

**Activity: Test and Evaluate FAA Critical Systems**

Conduct penetration test on FAA High Value Assets test using standard operating procedures.

**Target: Enhance Penetration Test Standard Operating Procedures to Support FAA High Value Assets Test**

Integrate lessons-learned, programmatic requirements, and tools into the Penetration Test Standard Operating Procedures (SOP).

**Target: Conduct Pen-Test on FAA High Value Assets Systems**

Conduct penetration test on at least 10 FAA High Value Assets (HVA) systems to support FAA mission critical operation.

**Activity: Reduce Research and Development Domain Cyber Risks**

Collaborate with system owners of the research and development (R&D) domain to reduce information technology assets cyber risks.

**Target: Plan for Enhancing the Information Security Monitoring and Detection Capabilities in the Research and Development Domain**

Develop a plan for implementing and integrating a Security Information and Event Management (SIEM) capability in the research and development (R&D) domain.

**Target: Enhance Information Security Monitoring and Detection Capabilities in the Research and Development Domain**

Implement a Security Information and Event Management (SIEM) capability to monitor cyber events in the research and development (R&D) domain.

**Activity: Develop Enterprise Zero Trust Architecture**

Develop Zero Trust Architecture (ZTA) for agency wide implementation.

**Target: Draft Market Study Report with Recommendation for Zero Trust Pilot Testing**

Conduct a Zero Trust Industry Market study. Develop a draft market study report with recommendation for zero trust.



## **Target: Publish Market Study Report with Recommendation for Zero Trust Pilot Testing**

Publish and finalize market study report with recommendation for zero trust.

### **Initiative: Adopt Leading Practices in Risk Management**

Adopt leading practices in risk management from FAA, government, and industry to improve risk identification, assessment, and mitigation practices across ASH Program Offices.

### **Activity: Advance Aviation Safety by Connecting Air Cargo Risks to Aircraft Operations**

Cargo safety is a multi-disciplinary approach to safety that harnesses the knowledge of the FAA, airframe manufacturers, and aircraft operators to identify air cargo hazards and implement comprehensive strategies to mitigate risks. Cargo safety recognizes that air cargo risks are a result of many factors, to include a lack of shared knowledge on aircraft capabilities and the safety culture of the air cargo supply chain. The FAA is advancing cargo safety by bridging the knowledge and culture gaps through safety management partnerships, data sharing, research and global leadership to proactively identify and mitigate hazards.

#### **Target: Establish multi-disciplinary collaborative research to connect global air cargo safety initiatives through risk-hazard data collection, identification, and safety enhancements.**

Develop a comprehensive list of projects in an FAA Fire Safety Research Plan that enables the FAA to provide useful data and information to aircraft operators and airframe manufacturers on cargo fire risks that can compromise the effectiveness of aircraft systems. Explore dedicated R&D funding for the Fire Safety Branch to strengthen FAA fire research planning and execution and provide engineering and logistical support that will influence and enhance cargo safety globally; provide a recommendations briefing to the FAA Cargo Safety Executive Oversight Committee.

### **Initiative: Separation Standards and Analysis**

Provide separation standards and analysis for U.S sovereign airspace and international airspace where FAA has delegated authority to provide air traffic services.

### **Activity: Provide Analytical Studies and Safety Related Monitoring Services in Support of Separation Reductions**

Conduct and participate in separation standards and transportation system analytical studies, reviews, and meetings to provide recommendations and solutions to continually improve safety in the National Airspace System (NAS).

#### **Target: Attend and report at the International Civil Aviation Organization (ICAO) Separation and Airspace Safety Panel (SASP)**

Report on key Separation and Airspace Safety Panel initiatives significant to the FAA, to include implementation activities on the new longitudinal separation standard as well as concept of operations details for the Target-to-Target radial separation standard.

**Target: Attend and report at the International Civil Aviation Organization (ICAO) Regional Airspace Safety Monitoring Advisory Group (RASMAG)**

Provide yearly calculated risk data for the vertical and horizontal standards for Oakland and Anchorage oceanic airspace, identifying any significant trends.

**Activity: Provide Reduced Vertical Separation Minimum Regional Monitoring Agency Functions**

Provide the Reduced Vertical Separation Minimum (RVSM) Regional Monitoring Agency (RMA) functions for 2 RMAs. Conduct and participate in separation standards and transportation system analytical studies, reviews, and meetings to provide recommendations and solutions to continually improve safety in the National Airspace System (NAS).

**Target: Attend and report at the International Civil Aviation Organization (ICAO) Regional Monitoring Agency Coordination Group (RMACG)**

As the RMACG Chair, provide technical leadership on monitoring requirements and capability, and details of the US monitoring programs, safety reports, and yearly audit results.

**Target: Monitor and share Reduced Vertical Separation Minimum (RVSM) performance within US delegated airspace**

Calculate Altimetry System Error (ASE) and Assigned Altitude Deviation (ADD) data from domestic and international traffic within US airspace. Respond to flight plan audits from other Regional Monitoring Agencies regarding approved Reduced Vertical Separation Minimum capability.

**Initiative: Digital Systems and Technologies**

Conduct Digital Systems and Technologies research to ensure the continued safety and security of enabling systems and technologies.

**Activity: Conduct Digital Systems and Technologies Research**

Conduct research to ensure the safety and security of digital systems and technologies that enable the aviation industry.

**Target: Initiate with aviation industry the development of the Cyber Security Data Science (CSDS) Aviation Architectural Framework (AAF)**

Develop and formalize the Cyber Security Data Science Aviation Architectural Framework with a specific initial draft aviation ecosystem use case, to engage with industry for further analysis and development.



### **Target: Conduct Digital Systems and Technologies research on the Assurance of Airborne Safety-Critical Systems**

Assess and document the use of machine learning technology to determine the worst-case execution time of avionics software to mitigate safety risk on airborne safety-critical systems.

### **Target: Conduct Big Data Analytics Working Group Workforce Activities**

Complete the first introductory phase (essential level) of the micro-credential training for data analytics and artificial intelligence/machine learning topic areas, then help launch the intermediate phase (exploration level) of the program, including implementation of a curated FAA data set applying machine learning on the FAA's cloud platform.

### **Initiative: Potential/Emerging Safety Issues**

Improve the ability to identify and assess safety risks through advanced analytics.

#### **Activity: Potential/Emerging Safety Issues**

Improve the ability to identify and assess safety risks through advanced analytics.

### **Target: Potential/Emerging Safety Issues (ANG)**

Screen potential/emerging safety issues through the FAA Safety Issue Identification and Management Process and submit an annual FAA safety issue screening report to the FAA SMS Executive Council by September 30, 2022.

### **Initiative: NextGen Portfolio Management**

Collaborate with stakeholders to continually improve NextGen planning and benefits delivery.

#### **Activity: NextGen Portfolio Management**

Collaborate with stakeholders to continually improve NextGen planning and benefits delivery. Ensure all funds are executed in accordance with Federal guidelines and FAA procedures.

### **Target: First quarter report status of Project Level Agreement (PLA)**

Quarterly report status of Project Level Agreement (PLA) deliverable execution for all active PLAs. Ensure 100% tracking of all deliverables.

### **Target: Second quarter report status of Project Level Agreement (PLA)**

Quarterly report status of Project Level Agreement (PLA) deliverable execution for all active PLAs. Ensure 100% tracking of all deliverables.

### **Target: Third quarter report status of Project Level Agreement (PLA)**

Quarterly report status of Project Level Agreement (PLA) deliverable execution for all active PLAs. Ensure 100% tracking of all deliverables.

### **Target: Fourth quarter report status of Project Level Agreement (PLA) deliverable**

Quarterly report status of Project Level Agreement (PLA) deliverable execution for all active PLAs. Ensure 100% tracking of all deliverables.

## **Initiative: Human and Aeromedical Factors**

Conduct Human and Aeromedical Factors research to address human-system interactions in an evolving NAS as well as the impact of flight on humans.

### **Activity: Flightdeck/Maintenance/System Integration Human Factors (A11.f Requirement)**

The Core Flight Deck research program provide the research foundation to update and maintain human factors related regulations, advisory circulars, procedures, Orders, standards, job aids, and other materials to support aviation safety and productivity. Program outputs also address the human factors impact of rapid changes to current-day technologies, procedures, and emerging issues.

#### **Target: Reference Document for Flight Standards Human Factors RDFSHF**

Reference Document for Flight Standards Human Factors (RDFSHF), Crew Resource Management (CRM) Section

#### **Target: Reference Document for Flight Standards Human Factors (RDFSHF) Final Report**

Reference Document for Flight Standards Human Factors (RDFSHF) Final Report

#### **Target: Pilot Visual Scanning Techniques of Instruments, Systems, and Outside References for Flightpath Management**

Transport Category Aircraft Draft Report (DRAFT)

### **Activity: NextGen Tasks, Skills, Procedures, and Training for NextGen Air Carrier Pilots**

This research responds to gaps in FAA regulatory and training guidance to enable the evaluation of new NextGen pilot knowledge, skills, and abilities. This research proactively identifies air-ground user adaptation needs to support the successful implementation and operational use of NextGen capabilities and procedures.

#### **Target: iOS Application Development for EFVS Visual Advantage Operational Data Collection (Phase 2 of 2):**

Final Technical Report (DRAFT)

#### **Target: Final Report with HF Recommendations to support FAA guidance**

Final Report with HF Recommendations to support FAA guidance addressing procedural and NextGen air carrier training vulnerabilities

#### **Target: HF Guidance for the Design & Evaluation of Multi-Modal Aircraft/Flight Deck Controls (Phase 3 of 3):**

Final Report

### **Activity: Conduct Human Factors Research**

Conduct human factors research to address human-system interactions in an evolving NAS.

**Target: Develop Human-Machine Teaming Knowledge Base**

Through literature reviews and workshops, develop a knowledge base of critical research issues in the area of human-machine teaming in air traffic control and technical operations. Collaborate with experts from NASA, DoD, DOT to prioritize and document research questions and potential requirements.

**Target: Develop Color Standard for High Ambient Lighting Air Traffic Control Environments**

Develop a standard for the use of color for displays in the bright ambient light conditions in airport traffic control towers and similar environments, including color parameter values, test criteria, and implementation guidance.

# People

Strengthen our current and future aviation workforce by holding ourselves accountable, developing our people and planning for the aviation workforce of the future

## Maximize the Benefits of Diversity, Equity, Inclusion, and Accessibility

Develop and implement a comprehensive strategy to ensure a more thoughtful, robust workforce environment that embraces the diverse talents of employees, ensures fair and equitable treatment, and advances broader gains in diversity, equity, inclusion, and accessibility.

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### **Initiative: EEO/Diversity and Inclusion Action Committee (EAC)**

Utilize the EEO Action Committee (EAC) to collaborate and support a diverse and inclusive workplace with existing employee workgroups and LOBs/SOs to create an inclusive work environment.

#### **Activity: Ensure a Diverse and Inclusive Workforce - Reasonable Accommodations**

ACR will lead collaboration with LOBs/SOs to foster an inclusive work environment throughout FAA that promotes opportunities for all, including traditionally underrepresented groups such as Hispanics, Women, and People with Disabilities (PWD) / People with Targeted Disabilities (PWTD) by improving the Reasonable Accommodation interactive process.

#### **Target: ANG - Reasonable Accommodations**

Ensure that at least 90% of reasonable accommodation requests are processed within 25 business days or less.

#### **Activity: Ensure a Diverse and Inclusive Workforce - Mediation**

Managers engage in the mediation/facilitation process when requested.

#### **Target: ANG - Mediation**

Ensure that 75% of managers engage in mediation when requested by employees.

### **Initiative: Train Managers and Employees across the Agency in Diversity, Equity, Inclusion, and Accessibility (DEIA)**

ACR will lead collaboration with LOBs/SOs to train managers and employees in DEIA.

#### **Activity: ACR will Lead Collaboration with LOBs/SOs to Train Managers and Employees in DEIA**

Ensure at least 75% of managers and 25% of employees from each LOB/SO attend a minimum of one training course from a menu of DEIA training courses such as Harmony & Respect, Reasonable Accommodations, Preventing Bullying, Equity, Hiring People with Disabilities (PWD) / Targeted Disabilities (PWTD), and Transgender.

#### **Target: ANG - Train Managers and Non-Managerial Employees in a Minimum of One DEIA Training Course**

Ensure at least 75% of managers and 25% of employees attend a minimum of one training course from a menu of DEIA training courses such as Harmony & Respect, Reasonable Accommodations, Preventing Bullying, Equity, Hiring People with Disabilities (PWD) / Targeted Disabilities (PWTD), and Transgender.

## Develop an FAA Employee Lifecycle Management Approach

Develop an FAA Employee Lifecycle Management Approach that promotes career opportunities, growth, and wellness through restructured recruitment and hiring; and continuous employee investment, development, and training towards the health of the agency.

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### **Initiative: Workforce Development and Recruiting**

Maintain a highly skilled workforce. Recruit and develop workforce to meet future demands and challenges and fulfill technical and managerial needs.

#### **Activity: Rotational Development Exchange Program**

Design, develop and pilot rotational development or exchange program to enhance selected knowledge and/or skill(s) of non-managers.

##### **Target: Design and Develop Rotational Development Exchange Program**

Design a rotational development program for non-managers to increase leadership skills, technical skills and competencies.

##### **Target: Prepare and distribute quarterly report on Rotational Development Exchange Program implementation status**

Prepare presentation and justification for senior management review and approval of Rotational Development Exchange (RDE) Program.

##### **Target: Develop Rotational Development Exchange Detail Assignment Calendar as provided in Program Implementation Plan**

Design and develop calendar of rotational development detail assignments within ANG and in collaboration with other FAA LOB/SO's.

##### **Target: Rotational Development Exchange Merger in support of the ANG Succession Plan**

Equip workforce with technical and non-technical knowledge and skills to foster innovation, create solutions, and positively influence others in service of mission accomplishment.

##### **Target: Pilot the Rotational Development Program**

Pilot the program by offering up to five detail opportunities within ANG.

#### **Activity: Technical Curriculum Implementation**

Equip workforce with technical and non-technical knowledge and skills to foster innovation, create solutions, and positively influence others in service of mission accomplishment.

### **Target: Training Events**

Each month, distribute a three-month rolling calendar of upcoming training events and associated seat allocations to each ANG Directorate for use in matching and enrolling employees with most valuable opportunities. (Due: By the 15th of the month prior to when calendar is effective).

### **Target: Publish & Distribute Monthly Report**

Publish and distribute a monthly report of: 1) enrollments and seats available by Directorate for each sponsored Tech Curriculum course to be delivered in the upcoming month; and 2) completions by Directorate for courses delivered in the prior month. (Due: By 20th business day of each month.) Publish and distribute a weekly Corporate Training Report of training completions status and distribute to ANG Managers to reflect completions and progress only. Otherwise will be reflected in a monthly report.

### **Target: Tech Talks Speaker-Series**

Bring in and promote at least eight speakers over the year from inside and outside the FAA as part of ANG's Tech Talk Tuesday speaker series.

### **Target: Tech Curriculum Training Tracking and Reporting**

Monthly, upload into eLMS each Directorates Tech Curriculum training from their planned tech curriculum training schedules. Create and deliver the required training format for transmission and delivery of the training data to be uploaded to eLMS and the ANG Action Tracker and share with Directorate training POCs. All Tech Curriculum Training recorded must be uploaded to employee learning profiles within 30 days of receipt from the Directorate POCs.

### **Activity: Managerial Leadership Development for Non-managers**

Build capabilities of non-managers to perform more effectively and produce positive outcomes in informal or formal leadership and managerial roles.

### **Target: Non-management Leadership Development Curriculum**

Continue to offer monthly training and development courses to ANG non-managerial workforce throughout the year with emphasis on enhancing managerial and leadership competencies.

### **Activity: Recruitment - NextGen Gateway Program**

Recruit and hire student Interns to assist in the agencies succession planning goals.

### **Target: Recruit Students**

Subject to position availability, recruit new students into the NextGen Gateway student internship program in order to assist in the agency's succession planning.

### **Target: Convert to Full-Time Permanent Employees**

Subject to position and funding availability, convert program participants to full-time permanent employees without further competition, after successful completion of the program.



### **Activity: Institutionalize the Technical and Research and Development Curricula**

Collaborate across the ANG organization to institutionalize the technical and research and development curricula. Incorporate results of the Align Processes and Systems effort, as appropriate. The result of this effort will be an ANG organization that understands and utilizes the Technical and Research and Development Curricula as a tool for employee growth and development.

#### **Target: Engage Workforce to Implement Technical and Research and Development Curricula**

Sponsor at least three information sessions to engage employees and managers and create accountability for further curricula implementation and maintenance.

#### **Target: Evaluate Effectiveness**

Develop and execute a plan of action, based on metrics and feedback, evaluating the effectiveness of the technical and research and development curricula.

#### **Target: Optimize Processes and Systems**

Adjust and enhance curriculum components that have been integrated into the recruitment, onboarding, and performance management processes.

### **Initiative: Small Business Opportunities**

Support small businesses and job creation by providing opportunities for small businesses to attain FAA contracts and purchase orders, with special emphasis on procurement opportunities for socially and economically disadvantaged small businesses (including 8(a) certified firms), service-disabled veteran-owned small businesses, and women-owned small businesses.

#### **Activity: Contracting with Small Businesses**

Utilize market analysis and acquisition strategies to provide opportunities for small businesses to compete for, and attain FAA contracts and purchase orders, with special emphasis on procurement opportunities for socially and economically disadvantaged small businesses (including 8(a) certified firms), service-disabled veteran-owned small businesses, and women-owned small businesses.

#### **Target: ANG-A - Support ACQ's Small Business efforts**

Support ACQ's efforts to ensure 25% of the Agency's total direct procurement dollars are awarded to small businesses.

#### **Activity: Contracting with Small Disadvantaged Business (SDB)**

Utilize market analysis and acquisition strategies to provide opportunities for Small Disadvantaged Businesses (SDB) to compete for and attain FAA contracts and purchase orders.

#### **Target: ANG-A - Support ACQ's Small Disadvantaged Business efforts**

Ensure at least 12% of the Agency's total direct procurement dollars are awarded to Small Disadvantaged Businesses (SDB).

**Initiative: Strong Acquisition Workforce**

Ensure FAA has the staffing and skill mix to successfully manage NextGen and other major acquisitions by implementing training, developing and certifying personnel in key acquisition professions.

**Activity: Train and Certify FAA's Acquisition Workforce**

Attain and maintain certification requirements of program managers (PMs) and contracting officers.

**Target: Attain and maintain certification requirements (ANG)**

90% of program managers (PMs) on Office of Management and Budget (OMB) major acquisition programs attain/maintain certification requirements for their positions.

# Global Leadership

Advance global aviation safety, operational excellence and innovation by leading and collaborating with aviation authorities globally

## Global Aviation Safety and Security Enhancements

Improve global aviation safety and security through targeted assistance and collaboration, partnerships on aviation system safety oversight, streamlining regulatory environments, and promoting higher levels of global airspace and cyber security.

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### **Initiative: National Airspace System Global Information Security Standards**

Collaborate with International Civil Aviation Organization (ICAO), Eurocontrol, Single European Sky Air Traffic Management (ATM) Research (SESAR), and other international partners to plan and develop a cybersecurity proof of concept to inform ICAO of requirements and policies needed to realize a global trust framework and to integrate the cybersecurity concept of operations into the Global Air Navigation Plan.

### **Activity: Evolve National Airspace System NAS Global Information Security Standards**

Collaborate with International Civil Aviation Organization (ICAO), Eurocontrol, Single European Sky Air Traffic Management (ATM) Research (SESAR), and other international partners to develop a cyber-security proof of concept to inform ICAO of requirements and policies needed to realize a global trust framework and to integrate the cybersecurity concept of operations into the Global Air Navigation Plan.

### **Target: Trust Framework International Civil Aviation Organization ICAO Assembly Paper**

Coordinating with the FAA Line of Businesses (LOBs), Interagency Group on International Aviation (IGIA) and international partners to deliver a US position on the operationalization of the International Aviation Trust Framework (IATF) to the next International Civil Aviation Organization (ICAO) assembly. Draft assembly paper for FAA and IGIA coordination to operationalize the International Aviation Trust Framework.

### **Target: Certificate validation service for Un-Crewed Aircraft System Traffic Management**

Provide external entities the ability to verify and validate FAA issued International Aviation Trust Framework (IATF) compliant certificates. Deploy IATF compliant certificate validation service for Un-crewed Aircraft System (UAS) Traffic Management (UTM) in the FAA Cloud Services (FCS).

### **Initiative: Cybersecurity in the Aviation Ecosystem**

The FAA will develop strong relationships with external commercial and Government partners to enable a more informed threat and defense capability, and leverage information and defense actions needed to protect FAA systems and networks.

### **Activity: International Cybersecurity Resilience**

Promote common understanding of cyber threats, vulnerabilities, and resultant risk across the Aviation Ecosystem, and encourage information-sharing among government partners and Aviation stakeholders on aviation cybersecurity best practices and initiatives.

### **Target: Finalize FAA Position on International Aviation Trust Framework**

Coordinating with the FAA LOB's, Interagency Group on International Aviation (IGIA) and international partners to deliver a US position on the operationalization of the International Aviation Trust Framework (IATF) to the next International Civil Aviation Organization (ICAO) assembly. Draft assembly paper for FAA and IGIA coordination to operationalize the International Aviation Trust Framework.

## **Seamless and Sustainable International Operations**

Promote seamless, harmonized, and sustainable international operations by improving operational excellence in delegated airspace and neighboring FIRs, international capacity building, research and innovation, and environmental sustainability.

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### **Initiative: ANG International Harmonization**

In alignment with the FAA and the ANG International strategy, promote the international acceptance of NextGen policies, procedures and technologies. Work with identified air traffic modernization partners, through established bilateral and multilateral mechanisms, to harmonize identified efforts with NextGen and assess opportunities to establish new opportunities.

### **Activity: ANG International Collaboration**

In alignment with the NextGen International Strategy and in anticipation of the dissemination of the FAA's Info-Centric National Airspace System (NAS) concept, by September 30, 2022, develop and submit a report on the status of research and development (R & D) activities in current & potential NextGen Tier 1 partners (currently the International Civil Aviation Organization, European Union, Japan, Singapore, Thailand and United Arab Emirates). The report could include a review of current air traffic modernization work, its potential to support FAA modernization activities, and proposed FAA engagement plans in conjunction with international Line of Business and Staff Offices (LOB/SO) if viable.

### **Target: Tier 1 Partners**

In coordination with our Tier 1 partners, attend established bilateral and multilateral meetings and events. Garner agreement to promote NextGen programs and policies into global plans and standards, promoting harmonization with NextGen.

### **Target: Tier 2 Partners**

In coordination with the FAA international LOB/SOs, identify engagement opportunities for bilateral and/or multilateral meetings and/or events with Tier 2 partners pursuing Air Traffic Management (ATM) modernization that could be harmonized with NextGen and participate as necessary.

### **Target: Tier 3 Partners**

In coordination with the Office of International Affairs (API), assess opportunities to pursue bilateral and/or multilateral meetings and/or events with Tier 3 partners to promote Air Traffic Management (ATM) modernization and participate if possible.

## **Enterprise Global Leadership Approach**

Develop an FAA enterprise approach that reimagines how the agency engages in the international arena.

## **Initiative: NAS / Global Standards**

Collaborate with industry to establish Standards for Aviation Community.

### **Activity: Multi-Regional Trajectory Based Operations Demonstration - Phase 2**

During Phase 2, the project will collaborate with industry and international partners and key internal stakeholders to enhance the baseline Florida Nextgen Testbed (FTB) capabilities, operational scenarios and use cases that were established during Phase 1 in order to demonstrate the operational values of key trajectory based operations (TBO) concepts and technologies. This collaborative effort will explore the impacts of TBO within the context of modernization initiatives; supporting the development of data exchange standards, and provisions and implementation guidance materials related to post-departure operations with various levels of equipage and crew capabilities. This solution will be accomplished through the conduct of multiple demonstrations of full, end-to-end operational scenarios culminating in a final demonstration with live flight components.

#### **Target: Updated Operational Scenarios and Use Cases Document.**

This document will describe and illustrate operational concepts, scenarios, and use cases developed in preparation for the follow-on TBO demonstrations. The operational scenarios will describe the step-by-step process of the operations, practices, and procedures, and retrace those same operational conditions under the proposed demonstration concept

#### **Target: Updated System Architecture and Capabilities Document.**

This deliverable will describe and illustrate the architecture design that will be employed during the MR TBO demonstration exercises. It will also incorporate any new capabilities and modifications to the current systems that are critical to the successful execution of the relevant follow-on demonstrations. This includes new functionalities to systems at the NextGen Florida Test Bed (FTB) to address the execution of the operational scenarios during the demonstration.

#### **Target: Lab Demonstration Report.**

This report encompasses the activities undertaken to exercise full operational scenarios developed by FAA and international partners in order to complete the demonstration of defined TBO capabilities across multiple Airspace Service Providers (ASPs) and phases of flight in a laboratory environment. After the Lab Demonstration is completed, the report will be submitted that addresses the execution and findings of the demonstration. The content will include the methodologies, results, lessons learned, as well as recommendations for the Ground Demonstration and Live Flight Demonstration. Due August 31, 2022

### **Activity: Global Standards - Aeronautical Information Exchange Model**

Continue to conduct analysis and establish processes to inform the further development of Aeronautical Information(AI) dependent projects and services within the NAS using the standards established by the Aeronautical Information Exchange Model (AIXM) community.

#### **Target: Aeronautical Information Exchange Model (AIXM) community**

Develop a report outlining the findings of an engineering analysis built off of the plan developed for US extensions to FAA exchange models reference model. This will include steps for integration, data integrity, and user needs/requirements

**Target: Flight Information Exchange Model (FIXM)**

Create an updated plan for an exchange model agnostic process to request and implement exchange model extensions, including leveraging existing processes and coordination with the exchange model stakeholder communities, including Flight Information Exchange Model (FIXM), Flow Information Exchange Model (FLXM), Aeronautical Information Exchange Model (AIXM), and ICAO Meteorological Information Exchange Model (iWXXM).

**Target: Air Traffic Information Exchange Conference (ATIEC).**

Generate a report that details all aspects of coordination for the Air Traffic Information Exchange Conference (ATIEC). It will include briefing material, action items, lessons learned, and notes captured, among other elements.



# Operational Excellence

Operate the world's most efficient aerospace system through daily execution, continuous improvement and infrastructure investment.

## Optimize Mission Efficiency and Support

Optimize efficiency and support mission requirements through daily execution, continuous improvement, planning, and investment. Effectively plan for and manage finances, procurement, information technology, and other mission support services.

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### **Initiative: Modernization of William J. Hughes Technical Center's Operations and Infrastructure**

Modernization of technical center's infrastructure to ensure facilities operate efficiently and effectively.

#### **Activity: Design and Engineer facility Improvements to William J. Hughes Technical Center**

Design and engineer facility improvements to William J. Hughes Technical Center (WJHTC).

##### **Target: Execute mold remediation projects**

Complete at least 25% of the construction related to Technical and Administrative Building 300 Mold Removal and AC-2 & 3 Replacement project.

##### **Target: Perform Congressionally mandated energy improvements**

Replace at least 75% of the windows, doors and skylights in Integration and Interoperability Facility Building 27, Research and Development and Human Factors Laboratory Building 28, and Technical Support Facility Building 305.

### **Initiative: Research and Development Management**

A vibrant aviation sector relies on a safe, efficient, and cost-effective aerospace system. To that end, the FAA will invest in and manage a research and development portfolio that engages aviation stakeholders across industry, academia, and federal partners to promote aviation technology innovation, enable new entrants, leverage non-federal research investments and prioritize FAA investments to address critical industry needs and drivers.

#### **Activity: Provide Partnership Opportunities to Industry, Academia, or government via Various Agreements**

Author and manage new agreements and participate in symposiums, reviews, and meetings.

##### **Target: Continue and strengthen relationship with Mike Monroney Aeronautical Center and Civil Aerospace Medical Institute relative to mutual goals and objectives**

Hold program review on mutual goals biannually.

**Target: Develop Fee for Service Program Proposal**

Develop and present a plan for a fee for service program office for Technical Center labs.

**Activity: Manage the planning and coordination of the Research and Development Portfolio**

Manage the planning and coordination of the Research and Development (R&D) portfolio to ensure alignment with departmental and agency R&D priorities.

**Target: Coordinate development of the FY24 RE&D portfolio**

Develop and coordinate FY24 RE&D portfolio with the Research Engineering & Development Executive Board (REB).

**Target: Develop Annual Modal Research Plan (AMRP)**

Submit Annual Modal Research Plan (AMRP) to Transportation Department's Office of Research and Technology .

**Target: Submit National Aviation Research Plan 2022-2027**

Prepare and submit National Aviation Research Plan 2022-2027 for Line of Business Concurrence.

**Target: Develop and Submit Office of Research and Technology Research and Development Fiscal Year 2023 Spend Plan**

Submit the FY2023 Spend Plan to Office of Technology Research and Development and Research.

**Initiative: Contract Administration, Agreements, and Grant Management**

Perform contract, agreements, and grant administration managed by ANG-A.

**Activity: Forecasting; Acquisition and Grants Planning; Acquisition and Grants Support Reporting**

Develop, manage and implement acquisition strategy to improve contract award process.

**Target: Quarterly Procurement and Grants Forecast Reports**

Provide quarterly Procurement and Grants Forecast Reports to each ANG Directorate for situational awareness. Due Date: 10/31/2021, 01/31/2022, 04/30/2022, 07/31/2022

**Target: Provide ANG Senior Management Contract and Grant Status Report**

Provide ANG senior management with Contract and Grant Status Reports monthly to support regular and accountability for customers utilizing active contracts and grants. Track and manage key administration and management progress to include award of new task orders and grants, along with associated modifications and options - Report status and progress quarterly to each ANG Directorate.

**Activity: Center for Advanced Aviation System Development**

Proactively administer contracts to provide improved communication and customer service.

**Target: Center for Advanced Aviation System Development Work Plan**

Develop Center for Advanced Aviation System Development (CAASD) FY23 Work Plan.

**Activity: Technical Service Contracts**

Proactively administer contracts to provide effective communication and customer service.

**Target: Execute Memorandum of Understanding (MOU)**

Execute Memorandum of Understanding (MOU) with all Lines of Business (LOBs) supported from the Systems Engineering and Development Support Budget Line item (BLI).

**Target: SETIS Award**

Award the new SETIS contract vehicle to replace SE2020/2025.

**Activity: Grant Management**

Continue to evolve and mature the new Grants Management Branch.

**Target: FY20 Aviation Workforce Development (AWD) Grant Awards - Aircraft Pilots Aviation Workforce Development**

Award \$5M of FY20 funds to the Aircraft Pilots Aviation Workforce Development Grant Recipients.

**Target: FY20 Aviation Workforce Development (AWD) Grant Awards - Aviation Maintenance Technical Workforce Development**

Award \$5M of FY20 funds to the Aviation Maintenance Technical Workforce Development Grant Recipients.

**Target: FY21 Aviation Workforce Development (AWD) Grant Awards - Aircraft Pilots Aviation Workforce Development**

Award \$5M of FY21 funds to the Aircraft Pilots Aviation Workforce Development Grant Recipients.

**Target: FY21 Aviation Workforce Development (AWD) Grant Awards - Aviation Maintenance Technical Workforce Development**

Award \$5M of FY21 funds to the Aviation Maintenance Technical Workforce Development Grant Recipients.

**Target: Veterans Pilot Training (VPT) Grant Awards**

Award FY22 Veterans Pilot Training (VPT) Grants.

**Initiative: Financial Management and Organizational Planning**

Implement improvements to enhance NextGen financial management. Ensure all funds are executed in accordance with federal guidelines and FAA procedures; Develop and Maintain ANG Strategic and Core Business Plan.

**Activity: ANG Business Planning**

Lead ANG leadership and planners in the coordination and development of the upcoming fiscal year's business plan to establish FY22 priorities and linkages to work units.

**Target: ANG's Business Plan Framework**

Facilitate leadership review and update of ANG's Business Plan Framework to establish upcoming fiscal year objectives and initiatives.

**Target: Conduct ANG Business Plan Kickoff**

Conduct ANG Business Plan Kickoff to deliver the upcoming fiscal year business plan development guidance, requirements and timelines to ANG planners.

**Target: Conduct One-on-One Reviews**

Coordinate individual ANG-1 meetings with directorates to review directorate-level activities supporting the priorities.

**Target: Upcoming Fiscal Year ANG Business Plan**

Gain ANG Leadership approval of upcoming fiscal year ANG Business Plan for submission to APO via SPIRE SBM.

**Target: ANG Resource Program Management Reviews**

Conduct Resource Program Management Review (RPMR) for all directorates to capture personnel and fiscal resources allocated in executing FY22 Business Plan priorities.

**Activity: Budget Formulation, Execution and Financial Planning**

Lead development of annual budget submissions (OST, OMB and President's) and execute enacted budget in accordance with agency policy and regulations.

**Target: Timely Delivery of Annual Budget Submissions**

Collaborate across ANG Directorates to ensure timely delivery of annual budget submissions in accordance with FAA timelines and provide a monthly assessment of F&E, OPS and R,E&D budget obligation rates (Due monthly).

### **Target: Perform Fund Certification Activities**

Perform fund certification activities within 3 business days of receipt of obligating documents that comply with FAA policy and regulations for 85 percent of randomly selected transactions, averaged over the fiscal year. (The statistical analysis is conducted once every quarter. DUE: 10/31/2021, 1/31/2022, 4/30/2022 and 7/31/2022).

### **Target: Project Level Agreements (PLAs)**

PLAs define and document the work agreements between ANG PfMs and the performing organizations executing the appropriated pre-implementation funds and deliverables ANG will receive. This documentation serves as a programmatic oversight of ANG pre-implementation work typically generated within a 12-18 month timeframe. PLAs are signed at the Director-level when funds are allocated and/or changed. Any adjustments to an existing PLA agreement and/or funding require amendments. PMA funding is derived by assessing PLA projects annually at a 1% to 5% fee. PMA funds PLA administration and project management support.

### **Target: FY22-26 Capital Investment Plans**

The CIPs identifies program descriptions, financial or technical interdependencies with other programs within the National Airspace System. The CIP unobligations/obligations, carry over, shortfalls and commitment budget amounts must match the latest ABP baseline report shown in SPIRE. The fiscal year (FY) spend plan projects ANG program requirements for the next three FY's and lists any upcoming Acquisition Decision Points (CRDR, IARD, IID, and FID).

### **Target: NextGen Investment Portfolio**

The NG Investment Portfolio identifies ANG F&E, R,E&D and OPS Enacted, President's Budget, Request allocations for three (3) fiscal years. The NG F&E programs consists of Transformation, Pre-implementation, Implementation and NG support portfolio activities.

## **Initiative: Zero Trust**

Pursuant to Executive Order 14028, Improving the Nation's Cybersecurity, develop a plan to implement Zero Trust Architecture. Incorporate, as appropriate, the migration steps that the National Institute of Standards and Technology (NIST) within the Department of Commerce has outlined in standards and guidance.

### **Activity: Zero Trust Implementation**

The FAA's Zero Trust implementation plan is initially focused on addressing the most critical areas within the Agency's ecosystem, allowing for an iterative expansion that is cost-effective and non-disruptive.

### **Target: Conduct a Zero Trust (ZT) Industry Market Study**

Conduct a preliminary Zero Trust (ZT) market study and analysis report for Software Defined Network (SDN) and Software Defined Perimeter (SDP). Brief the Cybersecurity Steering Committee (CSC).

### **Target: Develop Zero Trust (ZT) Concept of Operations**

Draft Concept of Operations document for Zero Trust Architecture (ZTA), containing operational uses cases. Deliver to stakeholders, including the IT Shared Services Committee (ITSSC) and Cybersecurity Steering Committee (CSC).

## Agile Services Across the NAS

Develop a comprehensive and agile set of requirements and processes to integrate traditional and emerging users of the National Aerospace System to determine appropriate infrastructure and operational needs of any given facility or airspace.

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### **Initiative: Airport Technology & Infrastructure Research**

Conduct Airport Technology & Infrastructure research to assess and improve the infrastructure at airports and spaceports across the NAS.

### **Initiative: Enterprise Systems Engineering and Integration**

Develop and maintain Systems Engineering Guidance Material and conduct key National Airspace System (NAS) Enterprise Integration studies. Provide enterprise systems engineering expertise to execute NAS enterprise integration studies to realize the future of the NAS vision.

#### **Activity: Sustain and Enhance the National Airspace System Enterprise Architecture**

Conduct a yearly update to the National Airspace System (NAS) Enterprise Architecture (EA) Roadmaps and NAS Segment Implementation Plan (NSIP). It also includes the addition of new content to the roadmaps and NSIP.

#### **Target: Annual National Airspace System Enterprise Architecture Roadmap and National Airspace System Segment Implementation Plan Update**

Spearhead the National Airspace System (NAS) Enterprise Architecture (EA) Roadmap and NAS Segment Implementation Plan (NSIP) annual update effort, ending with the NAS EA Products final publication on the NAS Systems Engineering Portal (SEP).

#### **Target: Integrate Info-centric National Airspace System Themes into Business and Technology Roadmaps**

Operations in an Info-centric National Airspace System (NAS) vision themes into the NAS Enterprise Architecture (EA) Business and Technology Roadmap artifacts and related data set. Coordinate and adjudicate draft business and technology roadmap related comments and update applicable artifacts and data during the 2022 NAS EA Update cycle.

#### **Target: Stakeholder Review of National Airspace System Enterprise Architecture Roadmaps**

Partner with the Air Traffic Organization's (ATO) service units (Program Management Organization, Mission Support Services, etc.), the Office of Finance and Management (investment planning and analysis), the Joint Resources Council (JRC) Secretariat, and other key stakeholders to conduct a senior stakeholder review of the draft National Airspace System (NAS) Enterprise Architecture (EA) Roadmaps.

#### **Activity: Improve National Airspace System Engineering Portal**

Conduct annual stakeholder review, update of NAS Systems Engineering Portal Roadmap and deliver software changes.

#### **Target: Update National Airspace System, Systems Engineering Portal Roadmap**

Collaborate with stakeholders to prioritize required National Airspace System (NAS), Systems Engineering (SE) needs. Publish NAS Systems Engineering Portal Roadmap.



### **Target: Deliver National Airspace System, System Engineering Portal Changes**

Deliver prioritized software changes to National Airspace System (NAS), Systems Engineering (SE) portal community

### **Activity: Readiness and Feasibility Assessment**

Perform readiness and feasibility assessment for FY22 in support of development of a more budget realistic National Airspace System (NAS) Enterprise Architecture (EA).

### **Target: Develop and Publish FY22 Readiness and Feasibility Plan**

The plan will document the process for performing the readiness and feasibility analysis, and the programs to be analyzed.

### **Target: Publish FY22 Readiness and Feasibility Report**

The FY22 Readiness and Feasibility report will document the analysis done across the selected programs and investments to help with the development of a budget-realistic architecture.

### **Activity: Improve Usefulness of the National Airspace System Enterprise Architecture Model and Target NAS Requirements Document**

Using the FY21 improved change process for National Airspace System (NAS) Requirements and the Enterprise Architecture Model (EAM), incorporate results of analysis as they become available from stakeholder organizations.

### **Target: Converge Current (As-Is) and Target (To-Be) Requirements in DOORS**

Merge functional content from the 2013 NAS Requirements Document (NRD) (As Is) and the 2021 Target NAS Requirements Document (TNRD) (To Be) in Dynamic Object-Oriented Requirements System (DOORS) and use attributes to identify current versus target status.

### **Target: Implement Requirements Browser on the Systems Engineering Portal**

Conduct User Acceptance Test of the new Requirements Browser (Phase 1) on the Systems Engineering Portal (SEP) to include the content change process.

### **Target: Update Surveillance Requirements in the Target National Airspace System Requirements Document**

Revise accuracy requirements based on Surveillance Portfolio Analysis Working Group feedback and leverage the National Airspace System (NAS) Requirements Document (NRD)/Enterprise Architecture (EA) change process to issue the requirements via a Target NAS Requirements Document (TNRD) update.

### **Target: Capture Reference Architecture Concepts in the National Airspace System Enterprise Architecture Model**

Revise the Working Draft National Airspace System (NAS) Enterprise Architecture Model (EAM) to include an updated version of the Layered Services Description Diagram (SV-4b) that captures the concepts presented in the Reference Architecture Document and the Automation Evolution effort. The new artifact might have a new designation and title. Publish revised products to the Systems Engineering Portal (SEP).

**Target: Demonstrate Proposed Application of the Reference Architecture Concept to the National Airspace System Enterprise Architecture Model**

Produce a sample Systems Interface Description Diagram (SV-1) that illustrates a proposal for applying the concepts from the Reference Architecture to the existing National Airspace System (NAS) Enterprise Architecture Model (EAM). Identify any changes to the architecture framework or modeling methodologies required to incorporate the Reference Architecture concepts. Generate a report and briefing package.

**Activity: Sustain Enhance Replace Initiative**

Select, plan, and coordinate the second Pilot Program for testing the Sustain Enhance Replace Initiative (SERI) analysis algorithm.

**Target: Sustain Enhance Replace Initiative Pilot 2 Plan**

Publish and socialize the Pilot 2 Plan with stakeholders and management.

**Target: Sustain Enhance Replace Initiative Pilot 2 Results and Recommendations**

Publish and finalize the Pilot 2 results. Provide and implement lessons learned and algorithm updates.

**Activity: RTCA Aviation Internet Protocol Suite NextGen Satellite Communications**

Development of the Radio Technical Committee for Aeronautics (RTCA) Aviation Internet Protocol Suite (IPS) NextGen Satellite Communications (SATCOM) Minimum Operational Performance Standards (MOPS) and Minimum Aviation Performance Standards (MASPS).

**Target: RTCA Aviation Internet Protocol Suite NextGen Satellite Communications Minimum Operational Performance Standards**

Development and review of the draft Aviation Internet Protocol Suite (IPS) NextGen Satellite Communications (SATCOM) Minimum Operational Performance Standards (MOPS) for Iridium Certus (DO-262).

**Target: RTCA Aviation Internet Protocol Suite NextGen Satellite Communications Development of the Draft Minimum Aviation System Performance Standards**

Development and review of the draft Aviation Internet Protocol Suite (IPS) NextGen Satellite Communications (SATCOM) Minimum Aviation System Performance Standards (MASPS) for Iridium Certus (DO-343).

**Initiative: Remote Towers**

The FAA will work with commercial vendors to support approval of Remote Tower Systems. These systems will potentially provide more cost effective solutions to traditional brick and mortar towers, especially for smaller rural communities.

### **Activity: Remote Towers**

In accordance with Section 161 of the FAA Reauthorization Act of 2018, Pub. L. 115–254, Remote Tower Pilot Program for Small and Rural Communities (the Act), the FAA is diligently investigating the use of Remote Tower technologies for use in the National Airspace System. FY22 is focusing on 1) developing technical requirements and evaluating the technology through Type Certification process, 2) evaluating operational feasibility at the 2nd pilot site, and 3) developing the policies and process for enabling Remote Tower system to be used in the NAS.

#### **Target: FAA Document Review for Remote Towers**

Document the sections of applicable FAA orders/documents that need to be updated to address remote towers in the FAA Contract Tower (FCT) Program.

#### **Target: Northern Colorado Regional Airport (FNL) Phase 1 Evaluations**

Complete Phase 1 Northern Colorado Regional Airport (FNL) remote tower passive operational evaluation.

### **Initiative: Automation Evolution Strategy (AES)**

FAA is exploring a service-based approach to modernize its NAS automation, with emphasis on a more timely, cost-effective, and agile development approach to the delivery of NAS capabilities. The Automation Evolution Strategy's key vision is the transition to a layered, service-based architecture that take advantage of modern development methodologies and technologies.

#### **Activity: Identify Requirements for Automation Evolution Strategy**

Identify key operational and infrastructure needs for the NAS computing, platform, and mission software layers to enable the proposed Automation Evolution Architecture. The activity will integrate Operating Environments, Information Security and Mission and Common Service perspectives.

#### **Target: Map the Automation Evolution Architecture**

Refine and classify the technical operating environments characteristics and operating principles. Map the automation evolution reference architecture computing resource elements to the operating environment technical operating principles.

#### **Target: Develop Initial Technical Architecture**

Develop the initial set of mission and common services technical architecture for the automation evolution strategy reference architecture platform and mission software layers and the operating environment principles architecture.

#### **Activity: Architecture Risk Reduction Activities**

Conduct automation architecture risk reduction activities to validate the proposed automation evolution architecture by developing and utilizing a proof-of-concept environment (e.g. modeling and prototyping) to mitigate high priority risks and identify opportunities.

### **Target: Proof of Concept 3**

Conduct risk reduction Proof of Concept#3 which includes the updates to current Flight Object Data Store and supported Data Model, interface with NAS Common Reference (NCR) for flight specific constraints, and support flight plan submission in mixed mode environment (i.e. flight plan in today's format and flight plan in Flight Information Exchange Model or FIXM format).

### **Target: Deliver Initial Architecture Description**

Deliver initial architecture description that includes platform layer analysis for various operational environments to support the security and performance needs of selected service groups in the Automation Evolution Strategy.

### **Target: Validate Operational and Technical Requirements**

Coordinate across risk reduction activities to capture activity results to support validation of operational and technical requirements.

## **Initiative: Charting Aviation's Future**

The National Airspace System (NAS) 2035 initiative includes activities for the research, development, concept maturation, and technology transfer of air traffic capabilities to build towards our goals for the NAS, including opportunities afforded by technology advances enabling changes to the future environment and the anticipated changes in the areas of operations, safety assurance, and infrastructure that modernize the NAS and facilitate the integration of new entrants. These activities are anticipated to deliver benefits in terms of efficiency, flexibility, throughput, safety, and predictability for all of air traffic management, including access for new entrants.

### **Activity: Assess and Evaluate Unmanned Aerial System Operating Environments**

This project will perform the engineering analyses required to incorporate UAM operations into the NAS. The UAM Engineering project will analyze unique traffic management needs to inform initial systems architecture, identify information exchanges, and highlight critical system interactions to support emerging UAM operations. This work will build on the UAM concept defined in UAM Concept of Operations v1.0, and in collaboration with National Aeronautics and Space Administration (NASA) and Industry stakeholders.

### **Target: Urban Air Mobility Corridors Placement Impacts on Air Traffic Control and Air Traffic Management Operations**

Target 1: Initial Urban Air Mobility Operations Analysis Report. The Urban Air Mobility Corridor Analysis work, performed to date, focused on the size and placement of Urban Air Mobility Corridors that both provided a benefit to the Urban Air Mobility community while minimally impacting Air Traffic Management (ATM) operations. Given the operating environments and probable size of the Urban Air Mobility Corridors, this report will determine internal operations (e.g., one-way, two-way, turns, passing, off-ramps) to assess whether Urban Air Mobility aircraft will be capable of such operations, and help determine Urban Air Mobility Corridor capacities. In performing the internal Urban Air Mobility Corridor operations analysis, performance, and participation requirements to traverse and cross a Urban Air Mobility Corridor will be considered and allocated.

### **Target: Develop the Urban Air Mobility Conceptual System Architecture document**

Initial Urban Air Mobility Concept Maturation Plan .This plan will identify an evolution of concepts to result in mature Urban Air Mobility Operations, breaking each concept element into open issues/questions. It will provide linkages between the elements that support a sequential progression towards more mature Urban Air Mobility operations. The expectation is that this plan can be referenced to understand required concept work,with its importance toward the mature state.

### **Target: Urban Air Mobility Concept of Operation 2.0**

This document expands on ConOps 1.0 by adding evolving concepts from both concept maturation and engineering tasks, as applicable, and will describe ATM vision to support initial Urban Air Mobility operations in the near-term. It will provide the foundation for ATM evolution that supports operations in the future. The document will define the concept, principles, and assumptions, describe key conceptual and operational elements, establish roles and responsibilities, and determine initial capability and technical requirements necessary to enable safe and efficient operations. Throughout the document development, the team will expand on existing Use Case and Scenario to drive key elements of the Urban Air Mobility ConOps 2.0, and engage in a series of tabletop and guided discussion activities with FAA internal and external stakeholders to refine, review, and vet the document content. This will ensure that all operational and integral aspects of Urban Air Mobility are considered and evaluated.

### **Activity: Advanced Air Mobility Beyond Visual Line of Sight National Airspace System Evaluation - Phase 2**

The Advanced Air Mobility (AAM) Beyond Visual Line of Sight (BVLOS) National Airspace System (NAS) Evaluation (BNE) Phase 2 will continue to evaluate the integration of BVLOS operations in the NAS using large (>55 lbs) unmanned aircraft systems (UAS) as a platform above 400ft Above Ground Level. This project will analyze, test, and evaluate (using live flights) multiple use cases and scenarios to identify gaps and associated impacts of BVLOS operations on Communication, Navigation, Surveillance (CNS) services and interactions among actors (Air Traffic Control, Unmanned Service Supplier, Remote Pilot In Command, manned aircraft pilots, etc.). Compared to Phase 1, Phase 2 research will evaluate scenarios with increased operational and environmental complexity, increased operational tempo, and variability of vehicles. This project will further advance the integration of BVLOS into the NAS.

### **Target: Operational Use Case Report - Phase 2.**

This report will illustrate specific examples of operational use cases that highlight The Advanced Air Mobility (AAM) Beyond Visual Line of Sight (BVLOS) National Airspace System (NAS) Evaluation (BNE) Phase 2 flight operations, and the required capabilities and interactions in live and simulated flight. It will consider existing and emerging capabilities, to formulate operational use cases with more complexities in the operations.

### **Target: Architecture and Capabilities Document – Phase 2.**

This document will describe the architectural design and capabilities required to support the AAM BNE Phase 2 live flight evaluation and comply with existing and future NAS standards, as well as identify key systems, data elements, and illustrate data flows to Phase 2 data exchange in live and simulated flight. The project team will coordinate with various program offices, standards committees, industry partners and key stakeholders in the planning and execution of this document.

### **Target: Live Flight Evaluation Execution Report – Phase 2.**

The Project Team must coordinate all demonstration activities with industry participants from the start to the end of demonstration. At the end of demonstration, the Project team must prepare AAM BNE Phase 2 Live Flight Evaluation Execution Report that shows compliance with the Live Flight Evaluation execution plan and capture all deviations with justifications. The AAM BNE Phase 2 Live Flight Evaluation Execution Report should also include lessons learned from the trials and propose future improvements based on the analysis of data gathered during the evaluation.

### **Activity: Cloud ERAM in a Box (Cloud-EIB)**

The Cloud En Route Automation Modernization in a Box (Cloud-EIB) prototype effort will finalize development and test planning documentation while continuing to seek EIB security authorization for a cloud deployment. In addition, a Gap Analysis document will be developed which highlights roadblocks to cloud implementation of command and control systems discovered while performing the activity.

### **Target: Complete Cloud-EIB Functional Requirements Final Draft**

Complete Cloud-EIB Functional Requirements Final Draft

### **Target: Complete Cloud-EIB Architecture Design Document**

Complete Cloud-EIB Architecture Design Document

### **Target: Complete Cloud-EIB Gap Analysis**

Complete Cloud-EIB Gap Analysis

### **Activity: Performance Based Flow Management (PBFM) eXtensible Traffic Management (xTM) Interactions**

Building on previous work which developed the Concept of Operations and Use Case documents, Performance Based Flow Management (PBFM) eXtensible Traffic Management (xTM) Interactions will investigate the interactions between traffic flow management (TFM) and xTM services within the PBFM environment. This will include development of operational scenarios and a series of tabletop exercises.

### **Target: Complete Project Kickoff Report**

Complete Project Kickoff Report

### **Target: Develop Operational Use Cases/Scenarios Initial Draft**

Develop Operational Use Cases/Scenarios Initial Draft

### **Target: Perform Tabletop Exercise #1**

Perform Tabletop Exercise #1



### **Activity: Flight Data Input/output Data/Message Analysis**

Following on from the previous Flight Data Input/output cloud capability analysis, this activity will perform a deep-dive analysis of the messages and data on interfaces between the Personal Computer RemoteControl Unit (PC-RCU) and En Route Automation Modernization (ERAM) and Terminal Flight Data Manager (TFDM) systems

#### **Target: Develop methodology and tools necessary to parse FDIO data**

Develop methodology and tools necessary to parse FDIO data

#### **Target: Complete FDIO Data/Message Analysis Initial Draft**

Complete FDIO Data/Message Analysis Initial Draft

#### **Target: Complete FDIO Data/Message Analysis Final Draft**

Complete FDIO Data/Message Analysis Final Draft

### **Activity: Innovative Airports**

The Innovative Airports project will investigate the use of low-cost technologies (such as mobile data networks) to provide situational awareness to pilots at non-surveillance airports. The project will develop a concept of operations and conclude with a demonstration of the prototyped surveillance capability.

#### **Target: Complete Innovative Airports Project Kickoff Report**

Complete Innovative Airports Project Kickoff Report

#### **Target: Operational Scenarios Draft**

Complete Innovative Airports Concept of Operations Initial Draft

#### **Target: Complete Innovative Airports Concept of Operations Final Draft**

Complete Innovative Airports Concept of Operations Final Draft

### **Activity: Unmanned Aircraft System Traffic Management /Unmanned Aircraft System Traffic Management Data Exchange**

Perform systems engineering functions to develop and analyze Uncrewed Aircraft System Unmanned Aircraft System Traffic Management data exchanges.

#### **Target: Integrated Unmanned Aircraft System Traffic Management Data Models**

Complete Initial Integrated Unmanned Aircraft System Traffic Management Data Models to align emerging Unmanned Aircraft System capabilities. These data models will help align functions such as FAA Recognized Identification Areas (FRIA), Data correlation, and Unmanned Aircraft System registration.

### **Target: Complete Initial Unmanned Aircraft System Traffic Management Authentication Validation Report**

Complete Initial Unmanned Aircraft System Traffic Management Authentication Validation Report

### **Target: Conclude initial Unmanned Aircraft System Traffic Management Evaluation: Risk Model, and deliver final report detailing findings for evaluation activities, methodologies, and results.**

Develop an Unmanned Aircraft System Traffic Management risk model capability to conduct evaluations for the purpose of validating the feasibility and requirements of the system.

### **Activity: Charting Aviation's Future**

Charting Aviation's Future includes documenting the vision and high level concept of operations for an information-centric NAS. These activities will describe how technology advances will enable changes to the future environment in the areas of operations, integrated safety management, and infrastructure that modernize the NAS and facilitate the integration of new entrants. These activities are anticipated to deliver benefits for air traffic management in terms of efficiency, flexibility, throughput, safety, predictability, and access for new entrants.

### **Target: Develop a Concept of Operations for the Info-centric National Airspace System**

Develop an initial level I concept of operations for an info-centric National Airspace System (NAS) that describe the processes, technologies and services envisioned in Charting Aviation's Future.

### **Target: Mapping Connected Aircraft Evolution**

Develop initial mapping of connected aircraft evolution in support of Vision 2035.

### **Activity: Socialize NAS Vision 2035 Workforce Development Roadmap**

Socialize NAS Vision 2035 Workforce Development Roadmap encompassing the learning and development activities required to prepare ANG employees for the future, throughout the ANG organization.

### **Target: Evaluate Micro-credentialing Program - Essentials Level**

Obtain feedback from participants to evaluate the Essentials Level of the Micro-credentialing program.

### **Target: Optimize Micro-credentialing Program - Exploration and Experienced Levels**

Using provided feedback for improvement, complete the detailed design of the exploration and experienced levels of the Micro-credentialing program.

### **Target: Implement the Micro-credentialing Program - Exploration Level**

Utilizing pertinent data analytics, implement the Exploration Level of the Micro-credentialing program.

### **Activity: Flight Information Exchange Model (FIXM) Development**

Flight Information Exchange Model (FIXM) is the standard format of Flight Object data sent between systems, allowing more users to share flight information and coordinate on the various activities concerning a flight. The development will include U.S. specific extensions and core standard which is used internationally. FY22 work is aligned to maturing the NAS extension as well as progressing technical details of the international Core

#### **Target: Flight Information Exchange Model (FIXM)**

Complete draft Flight Information Exchange Model (FIXM) National Airspace System (NAS) Extension Artifact file to include data schema and logical models.

#### **Target: Global Unique Flight Identifier (GUFI)**

Complete Global Unique Flight Identifier (GUFI) structure technical proposal document. The proposal will include background of the problem, assumptions, and information supporting the proposed solution.

#### **Target: Flight Information Exchange Model**

Flight Information Exchange Model Core Change Request documentation. FIXM development requires extensive change request documentation to progress FIXM. Key change request documentation will be included to capture additions to the FIXM model.

## **Improve Performance of the NAS**

Develop and implement a comprehensive roadmap to support the evolution of the National Aerospace System as the foremost air data-driven navigation provider in the world.

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### **Initiative: Tech Transfer**

Facilitate the transition of technologies and capabilities between ANG, FAA, other agencies, and industry.

#### **Activity: Complete Technology Transfer**

Create visibility around technology transfer work to ensure overall benefit to the NAS.

#### **Target: Complete Tech Transfer T2 Record of Activities**

Submit final T2 Record of Activities for executive review and approval.

### **Initiative: National Airspace System Laboratory Facilities and Services**

Provide a set of world class laboratory facilities and services to support research, engineering and development, test and evaluation and maintenance of air navigation, air traffic management, and future air transportation system capabilities

#### **Activity: William J. Hughes Technical Center Laboratory Facilities**

Sustain, maintain, and improve the William J. Hughes Technical Center (WJHTC) National Airspace System (NAS) laboratory facilities.

### **Target: Implement Interval Management capability at the William J. Hughes Technical Center**

Implement the Interval Management (IM) algorithm into the Target Generation Facility (TGF) and Cockpit Simulation Facility (CSF) simulators. This is required for Trajectory Based Operations (TBO)

### **Target: Execute Space and Infrastructure Master Plan Projects**

Initiate 70% of planned Space and Infrastructure Master Plan projects scheduled for FY2022. This will help ensure that the overall Laboratory Space and Infrastructure Master Plan and associated projects are kept on schedule.

### **Target: Maintain International Organization for Standardization (ISO) 9001 Certification**

Maintain International Organization Standard (ISO) certification by meeting or exceeding customer requirements by maintaining a customer feedback response rating of 3.5 out of a possible 5.0.

### **Target: Improve Tower Lab infrastructure**

Upgrade tower out the window software to latest version of Virtual Immersion Environment Workspace. Replace tower tables with true field Air Traffic Control tower consoles. Update tower computer hardware and ATC displays.

## **Initiative: Aerospace Planning and Performance**

Research and development investments are balanced between strategic research initiatives to enable transformative change, and tactical research initiatives aimed at incremental improvements to current systems, while maintaining or improving operational safety. The FAA's Research, Development, Test & Evaluation (RDT&E) function at the William J. Hughes Technical Center, and supporting laboratories, provide a comprehensive approach to discovering, validating, and advancing technologies for a safer, more efficient, and more economically accessible NAS.

### **Activity: Flight Deck Collaborative Decision Making (FD CDM)–Enhanced Digital Taxi Instruction(e -DTI)**

Speech recognition (speech-to-text) technology presents an opportunity not only to transform traditional voice radio communication but could be an enabling technology to bridge the gap between voice and digital environment. As part of the digital transformation, several initiatives have been established within the FAA to develop concepts and capabilities to leverage flight deck connectivity to enhance collaboration and air traffic management services. This effort will enable the development and integration of speech recognition technology to enable verbal entry of taxi instructions for digital delivery. It will develop a lexicon to define a collection of phraseology including standard procedures and other operational variants that ATC uses to communicate taxi instructions to flight crews, used for support development of speech recognition software logic and training. This milestone also includes technology demonstration, to be conducted upon completion of the software development and integration.

### **Target: Speech-To-Text Transcription Analysis Report**

This report will investigate and describe speech analysis framework for transcribing verbal taxi instruction into a digital format before it can be disseminated to Electronic Flight Bag for visualization. This report will include a data workflow on how the taxi instruction will be transcribed from voice to text, and then to be broken down into data elements in preparation for visualization and delivered to the On-Demand NAS Information (ODNI) portfolio team.

### **Target: Lexicon for Taxi Instruction Phraseology Report**

The Lexicon for Taxi Instruction Phraseology will support a speech decoding algorithm and allow for accurate conversion of spoken taxi instructions to texts. This deliverable includes analysis on standard taxi instruction phraseology and investigate possible variants that are used in operating fields. The Lexicon will contain a collective list of vocabulary, phrasal verbs, and other multi-word compositions of taxi instructions. This report will be delivered to the On-Demand NAS Information (ODNI) portfolio team.

### **Activity: Advanced Methods**

The FY22 Advanced Methods work focuses on expanding prototyping activities to further develop new technologies, record lessons learned, and describe use cases surrounding the use of the new technologies.

### **Target: Complete Traffic Flow Management (TFM) Data Analytics Lessons Learned Document.**

This will collect lessons learned from both the technical and operational side during the development of this concept and prototype capability. The lessons learned will allow the FAA to identify information of value when technologies like this are used as well as general lessons learned about FAA systems, operations, and processes.

### **Target: Complete Traffic Flow Management (TFM) Speech Recognition Use Cases Prioritization Document.**

The use cases will examine the use of the candidate technology across a variety of situations and with a variety of inputs. The team will then prioritize the use cases for prototype consideration based on input from the technical team and project stakeholders.

### **Target: Complete Initial Machine Learning Prototype Development Report to detail the progress on the machine learning prototype design.**

Machine learning development reports will describe new functionalities, changes from the last report, challenges encountered, request for FAA operational insight, lessons learned, and recommendations for next steps.

### **Activity: Dynamic Airspace**

Proof of Concept Development: Dynamic Airspace will perform research and analysis for a toolset that allows dynamic reconfiguration of existing NAS automation infrastructure to meet the needs for changing demand and capacity in the NAS.

### **Target: Proof of Concept Engineering Plan**

Proof of Concept Architecture Document. This document will leverage detailed operational scenarios and information exchange schemas to define a high-level architecture at the Florida Test Bed and will include functional requirements and relevant system workflows / data flows.

### **Target: Airspace Identification and Scenario Development Report.**

Dynamic Airspace (DA) Capability Interface Control Document: This document will define message types and the data structure that needs to be transferred between the DA Reconfiguration Tool and other DA systems when initiating an airspace reconfiguration.

### **Target: Proof of Concept Final Report.**

This report will summarize the findings of the Proof of Concept Demonstration and will document technical issues, alternative actions, benefits realized from prototyping, and next steps for additional Proof of Concept activities or DA concept development.

### **Activity: Flight Deck Data Exchange Requirements (Digital Systems and Technologies)**

Conduct hardware-in-the-loop exercises to validate and test effectiveness of the security mitigations identified in the cybersecurity risks assessment of EFB, AID, and IP datalinks, and the security analysis of safety critical data, and identify gaps that may exist. The exercise will be conducted with a partner proof-of-concept NextGen program(s) and leverage its prototype system to implement the identified mitigations and perform security testing.

### **Target: Detailed Design of Security Test Integration Report.**

This report describes detailed design of the security test hardware and software, and how the components will be integrated with the candidate prototype system. This report encompasses required activities to perform systems integration, and the collaboration with partner program(s) to design and plan the security validation exercise. The design of the test components will consider the reusability factor to support future validation effort of the NextGen concepts. At a completion of the lab integration activity, the project team will document detailed design and integration, as well as challenges and lessons learned from the integration activity and deliver the report to to the On-Demand NAS Information (ODNI) portfolio team.

### **Target: Technical Report of a Lab Evaluation of Security Performance in a Networked Avionics Implementation**

This report will document the outcomes of the exercise to analyze every security risk and validate any corresponding mitigation(s) identified in the cybersecurity risks assessments for Electronic Flight Bag (EFB)/Aircraft INterface Device (AID), and Internet Protocol (IP) datalinks. The report will describe the ability of the mitigation(s) to successfully prevent intentional attacks and identify any new gaps that were not discovered during the paper-based exercise. The deliverable will document scope and assumptions that are used in the exercise, and describe lessons learned for potential next steps.



### **Target: Initial Cybersecurity Considerations for Connected Aircraft Applications Report.**

This report will develop an initial set of cybersecurity considerations to support development of flight deck data exchange applications. The initial considerations will describe areas of security concerns, relevant threats, and vulnerabilities, and provide general guidance for effective mitigations that can be used to manage the risks. The document will determine a suitable implementation approach to accommodate a variety of future flight deck applications. The Cybersecurity Considerations will focus on securing Electronic Flight Bag (EFB)/Aircraft Interface Device (AID), and Internet Protocol (IP) datalinks, but they may touch on other components/ layers in the flight deck architecture for effective protection as data traverses through avionics. This report will be delivered to the On-Demand NAS Information (ODNI) portfolio team.

### **Activity: Surface Tactical Flow Program**

The Surface Tactical Flow (STF) program will provide the tools necessary to achieve a fully collaborative surface environment where the input of airspace users, airports, and air traffic controllers are all used to provide a shared surface situational awareness and improved predictability.

### **Target: Airspace Technology Demonstration (ATD-2)**

Airspace Technology Demonstration (ATD-2) Technology Transfer Analysis Phase 3 will summarize the technology transfer assessment and related knowledge management activities for ATD-2 Phase 3. The report will highlight key findings and relationships to applicable FAA research and organizations.

### **Target: Strategic Demand Applications Technical Transfer Package**

Strategic Demand Applications Technical Transfer Package of Pacer functions to industry. Pacer, is a web application that allows pilots and flight operators to securely submit their departure intent information to Traffic Flow Management System (TFMS) to help better predict departure demand.

### **Target: Final Shortfall Analysis Report on On-Demand Surface Management.**

The report will identify and analyze potential shortfalls for low to medium density facilities with limited or no Terminal Flight Data Manager (TFDM) capabilities where airport surface congestion may occur either regularly, seasonally, or event-driven and propose possible corrective actions and next steps.

### **Activity: Class E Upper Airspace Traffic Management**

The Class E Upper Airspace Traffic Management (ETM) project will demonstrate the feasibility of integrating new entrants into Class-E Airspace by developing ETM concepts, scenarios, and engineering analyses in conjunction with NASA and Industry to validate the overall approach to managing this airspace.

### **Target: Provide an updated ETM Technical Evaluation Plan**

Provide an updated ETM Technical Evaluation Plan

### **Target: Develop and updated ETM scenario support package.**

Develop and updated ETM scenario support package.



**Target: Develop an ETM Paper Simulation Analysis report.**

Develop an ETM Paper Simulation Analysis report.

**Activity: Conduct Aerospace Planning and Performance Research**

Conduct research in System Safety Management, Unmanned Aircraft Systems, Wake Turbulence, and Advanced Technology Development/Prototyping for air traffic management tools/systems to ensure necessary capabilities and tools are available to meet increasing capacity demands while enabling emerging operations.

**Target: Adapt a NAS-wide, top-down Safety Risk Model to accommodate bottom-up Safety Risk Assessment**

Develop and document a data structure for ingesting safety risk concepts into the Integrated Safety Assessment Model (ISAM) format from accident/incident/mishap event reports such as Aviation Safety Reporting System (ASRS) and National Transportation Safety Board (NTSB) safety reports.

**Target: Develop and document Safety Performance Indicators**

Develop and document Safety Performance Indicators (SPIs) to monitor runway operations safety performance trends as part of an initial prototype proof of concept.

**Activity: Air/Ground SWIM Connected Aircraft**

This work pertains to the development of the Connected Aircraft (CA) concept, which describes a richer set of information to be exchanged with the aircraft and automation to improve operational awareness and decision-making; an integrated CA framework to further advance concepts that leverage the connected aircraft, including the exchange of information, based on applicable performance standards; the establishment of an Application Registry and Distribution Platform “App Store” that allows for the organization and distribution of relevant software applications; and a decomposition/categorization analysis of flight information tasks and decisions based on their use.

**Target: Create a Controller Decomposition of Flight Information Tasks and Decisions Report.**

Create a Controller Decomposition of Flight Information Tasks and Decisions Report.

**Target: Provide and updated Integrated Connected Aircraft Framework Report.**

Provide and updated Integrated Connected Aircraft Framework Report.

**Target: Provide and updated Data Distribution Concept Paper.**

Provide and updated Data Distribution Concept Paper.

**Initiative: Stakeholder Engagement & Outreach**

Enhance domestic and international stakeholder confidence in NextGen and engage stakeholders in NextGen through collaboration and messaging.

**Activity: Stakeholder Collaboration**

Enable and facilitate collaboration throughout the FAA, aviation community and interagency partners by sharing resulting actions, outcomes, and information.

### **Target: 80 Percent NextGen Advisory Committee Commitments**

Achieve eighty (80) percent of NextGen Advisory Committee (NAC) NextGen Priorities Joint Implementation Plan commitments, excluding industry-controlled milestones, within a calendar quarter of their scheduled dates.

### **Activity: Outreach Division**

Effectively communicate to stakeholders the NextGen initiatives in support of modernization for an information centric National Aerospace System (NAS).

### **Target: NextGen Report for Fiscal Year 2022**

Deliver the draft NextGen Report for Fiscal Year (FY) 2022 to the Assistant Administrator for NextGen.

### **Target: Text Analytics and Data Visualization Reporting**

Provide at least five (5) text analytics studies or data visualization products to requesting lines of business (LOBs) or staff offices to support strategic messaging and provide insight into an information-centric NAS.

### **Target: NextGen in the News Newsletter**

Provide at least fifteen (15) issues per month of the 'NextGen in the News' newsletter. 'NextGen in the News' is a compilation of the latest media articles about the FAA's efforts to modernize the National Aerospace System (NAS). It provides awareness to ANG and FAA leadership about the topics that are worthy of media coverage, and which media sources are publishing it.

### **Target: Extending ANG Messaging Capabilities Using the Web**

Incorporate new external and internal web content to highlight ANG activities and ensure validity of existing ANG website content to effectively communicate with ANG stakeholders and provide ANG employees with information they need to execute the requirements of their positions. Monthly web content reviews by directorate are required per the ANG web policy.

### **Initiative: Operations and Cost Benefits Analysis and Reporting**

Inform FAA/NextGen Stakeholders on the Enterprise level shortfalls and potential benefits of new capabilities as well as assessing post-implementation benefits of key implementations to further inform NextGen Advisory Committee (NAC) and other Stakeholders on value. Improve data analysis, modeling and visualization capabilities to better inform stakeholders on implementations with more complex benefit cases.

### **Activity: Post and Future Implementation Analyses to Support FAA Executive Leadership and NextGen Advisory Committee**

In support of the FAA, NextGen Advisory Committee (NAC), and other stakeholders key NAS implementations will be evaluated. Key implementations are those that are expected drive operational benefits to airspace users. Evaluations include support to the Joint Analysis Team (JAT) as well as other implementations with expected user benefits. Additionally, assessment of potential benefits from MCL equipage scenarios will also be completed as necessary.

### **Target: Joint Analysis Team North East Corridor Analyses**

Finalize collection of complex baseline data for normalization and begin post-implementation evaluation (as appropriate), to address key North East Corridor (NEC) implementations including Atlantic Coast Routes, Pre-Departure reroutes & Airborne Reroute (PDRR/ABRR), and work with Air Traffic Organization (ATO) on Time Based Flow Management (TBFM) at Philadelphia International Airport (PHL).

### **Target: Additional Post Operational Analyses**

Complete post operational analysis beyond what has been assigned to the Joint Analysis Team (JAT) and include normalizations necessary to adjust for COVID related demand changes. Also update NextGen's estimate of Implemented benefits as directed by ANG-1.

### **Target: Minimum Capability List Analysis**

Develop updated analyses of Minimum Capability List (MCL) benefits for Required Navigation Performance (RNP), DataComm, and other MCL avionics use in conjunction with TBO tools and procedures as requested by the FAA NIWG and NextGen Advisory Committee (NAC).

### **Activity: Trajectory Based Operation Shortfall and Benefit Analyses**

Conduct Trajectory Based Operation (TBO) shortfall and benefit analyses using historical data and modeling tools to inform dynamic TBO enterprise planning.

### **Target: Trajectory Based Operation Enterprise Level Shortfalls and Benefits for Arrivals**

Identify shortfall gaps between the integration of strategic and tactical systems, including contributions from departure conformance and flight time predictions including analyses of Time Based Flow Management (TBFM), Terminal Flight Data Manager (TFDM), and Traffic Flow Management System (TFMS), to inform future implementation prioritizations and research.

### **Target: Develop Trajectory Based Operation Initial 3T Shortfall/Benefits in Off-Nominal Conditions**

Develop refined benefit modeling and analysis at a minimum of 3 key sites during GDPs with focus on throughput, delay redistribution, and predictability.

### **Target: Departure Shortfall for Key North East Corridor Airports and Convective Weather**

Expand departure shortfall analysis during convective weather beyond North East Corridor (NEC). Potential study airports include: ORD, ATL, CLT, PHX, DEN, and SFO.

### **Target: Future Benefit Analyses**

Conduct future benefit analyses in support of ANG-C Air Traffic Management initiatives to inform implementation priorities and future research.

### **Activity: Analyses of Operational Shortfalls for National Airspace System Future Vision**

Conduct analysis of FAA research activities mapping to operational shortfalls including integration of Uncrewed Airspace Users (UAS) to understand baseline impacts on traditional airspace users.

### **Target: Conduct Low-altitude Operational Analysis**

Evaluate shortfalls and model impacts of low altitude traffic management initiatives as well as tripwires driving.

### **Target: Impact Analyses of Space Vehicle Operations**

Collect historical Space Vehicle Operations (SVO) data and conduct impact analysis on traditional traffic.

### **Target: ANG-1 Support for NextGen Benefits and Related Information Stakeholder Requests**

Provide ANG-1 continued support for answering stakeholder requests regarding NextGen benefits and related information.

## **Initiative: National Airspace System Test and Evaluation**

Test, analyze, and evaluate systems and services to verify and validate that products meet specifications, satisfy requirements, and are operationally suitable and effective.

### **Activity: Develop, Socialize, and Implement Verification and Validation Strategies and Practices.**

Conduct independent assessments of test work products and acquisition work products requiring verification and validation (V&V), based on established standards, in support of organizational and acquisition program objectives.

### **Target: Conduct Test Standards Board (TSB) independent objective assessment of key test work products**

Conduct 90% independent review of the William J. Hughes Technical Center's (WJHTC's) test work products for projects following the Test and Evaluation (T&E) Handbook in order to deliver the annual T&E Performance Report (quality assessment of T&E services/products and process improvement recommendations).

### **Target: Engage with Verification & Validation/Test & Evaluation community by hosting annual Verification & Validation Summit**

Host the Annual Verification and Validation Summit in order to engage the Verification and Validation Test and Evaluation community and industry to promote best practices, explore innovative, new and practical ways that support acquisitions of aviation systems and capabilities, and advance FAA missions and outcomes.

### **Activity: Provide Test and Evaluation Services to Support Implementation of National Airspace System Systems and Services**

Provide quality test and evaluation (T&E) and analysis products and services to ensure that current National Airspace Systems (NAS) and future air transportation systems are verified and validated using best practices and quality standards.

#### **Target: Communicate test project status with sponsors/stakeholders**

Prepare for annual portfolio review as scheduled by Program Management Office executive leadership (AJM-2, AJM-3, AJM-4).

#### **Target: Implement Test and Evaluation fiscal year project agreements for the delivery of test services and products**

Deliver test documentation as specified in FY22 Project Scope Agreements (PjSAs) with Program Office sponsors and customers for acquisition programs and projects requiring test services (Aeronautical Info., Mission Support, Air Traffic Management, Communications, Decision Support Systems, Flight Service, Navigation, Surveillance, and Weather).

#### **Target: Maintain Test and Evaluation ISO 9001:2015 certified Quality Management System (QMS)**

Maintain International Organization for Standardization (ISO) certification by conducting management reviews in accordance with the T&E QMS.

### **Initiative: Environment and Weather Impact Mitigation**

Conduct Environment and Weather Impact Mitigation research to develop mitigations to the environmental impacts of aviation operations as well as the impact of weather on air transportation safety and efficiency.

#### **Activity: Reduced Weather Impact-Weather Observations Improvement (RWI-WOI)**

WOI explores mitigating automated winter weather sensing shortfalls in the ground-based weather observation network via the vetting of technology solutions. WOI is completing a multi-year work package which aims to deliver a technical approach for improving the Automated Surface Observing System (ASOS) and Automated Weather Observation System's (AWOS) capability to report multiple simultaneous precipitation types and intensities as defined by an integrated product team including the solution implementer, the Weather Sensors Program Management Office, and key users, such as Flight Standards de/anti-icing research teams and aircraft certification stakeholders. Enabling the reporting of multiple simultaneous precipitation types will enhance winter weather information to support ground de-icing decisions. The final phases of this work package includes developing system design documents, engineering risk mitigation strategies, and mixed precipitation modeling and demonstration capabilities.

**Target: Impacts to Automated Surface Weather Observation Network (ASWON):**

Meteorological Aerodrome Report (METAR) Special Weather Report (SPECI) Generation Considerations. The subject report will document an analysis of potential increases in the number of METAR SPECI messages that are produced as a result of the addition of automated drizzle, freezing drizzle, and ice pellet reporting. Early engineering risk assessments indicate this number may be too high to efficiently support operational decision-making. This impact analysis will support the Safety Risk Management Process.

**Target: Report - Synergies of Proposed Deicing Holdover Tables and Evolved Automated Surface Weather Observation Network (ASWON) Present Weather Reporting.**

Flight Standards organizations are exploring new versions of deicing holdover and allowance tables that account for automated reporting of multiple precipitation types. This paper documents the relationship between these evolving policies and the evolving observation improvement strategy of ASWON. This impact analysis will support the Safety Risk Management Process.

**Target: Report - Present Weather Sensor as a Proxy for Temperature/Dew Point Measurement.**

Modern present weather sensors require temperature and dew point measurements to help discriminate precipitation identification and detection. The internal temperature and dew point measuring capabilities of the sensor rival the independent equipment used in the Automated Surface Weather Observation Network (ASWON) today. This paper documents the potential for equipment consolidation in this area and supports the ASWON sustainment business case.

**Activity: Reduced Weather Impact (RWI) - Weather Forecast Improvements**

The Weather Forecast Improvements (WFI) program addresses the need to improve weather prediction and the use of weather information in the future NAS. National Weather Service (NWS) forecast models will be integrated into models that forecast weather impacts for aviation purposes. In today's NAS, traffic managers and users must mentally interpret weather conditions and the potential impact of weather on ATC decisions. WFI will improve the accuracy of aviation weather information, to include the automated objective indication of the constraints placed on the NAS, and incorporate this data into collaborative and dynamic decision-making.

**Target: Complete Precipitation on the Glass Initial Requirements.**

Complete and submit draft FY24 RWI Enhancement 1 Resource Planning Document (RPD) and associated Capital Investment Team (CIT) updates using Spire BFM tool. Combined, these documents depict future aviation weather integration and/or aviation weather translation requirements, shortfalls and/or opportunities. The documents also prioritize work by correlating projected out year funding against the specified requirements, shortfalls and/or opportunities.



### **Target: Cloud Services for Aviation Weather -**

Offshore Precipitation Capability Architecture and Performance Description Document. This document will capture a cloud-based architecture in select Enterprise Architecture framework views as well as preliminary performance requirements. The architecture will consider analogous cloud service efforts of federal enterprise partners. The latest relevant documentation available for product generation of the Offshore Precipitation Capability will be utilized to define how a service-based implementation to OPC can be defined.

### **Target: Precipitation on the Glass Implementation Strategy Assessment Document.**

This document will outline the strategy and plan for NAS-wide implementation of the Precipitation on the Glass product considering dependent system states and investment schedule, facility limitations, and deployment assumption and constraints. Due September 1, 2022

### **Activity: New ATM - Weather Transition**

Identifies research concepts and capabilities that have appropriately matured and transitions them from RE&D to F&E funding. This PLA manages AMS Concept Maturity and Technical Development (CMTD) activities. It funds the development of Pre-CRDR AMS artifacts. It supports the transition of weather capabilities to FAA operational platforms. This program also supports the transition of aviation weather research to the National Weather Service (NWS) for operational production of weather capabilities to FAA platforms.

### **Target: Complete the Weather Requirements Service (WRS) Near-Term Roadmap**

Target 1: Complete the Weather Requirements Service (WRS) Near-Term Roadmap to include the FY21-26 As-Is and To-Be states to identify and analyze products in the R2O phases of development, weather needs identified via the Weather Needs Portal, and other established forums. This annual update will produce updated WRS near-term interagency roadmap recommendations by leveraging the work conducted to identify the weather needs in the FY20 Meteorology Technical Analysis and WRS Near-term Roadmap. This deliverable will continue to analyze and identify products in the R2O phases of development, and weather needs that are identified in the NAS via the Weather Needs Portal and other established forums.

### **Target: Complete the FY22 Emerging Weather Requirement Service Concept Operations Report**

Complete the FY22 Emerging Weather Requirement Service Concept Operations Report, which identifies the highest AJV-coordinated weather need. This Concept Definition deliverable will document an overarching list of newly-defined potential weather capabilities to provide to FAA operations and introduce steps in the evolution of the weather Enterprise Architecture to achieve performance capabilities supporting the National Airspace System.

### **Activity: Conduct Environment and Weather Impact Mitigation Research**

Conduct Weather, Icing and Alternative Fuels research to develop mitigations to environmental impacts of aviation operations as well as the impact of weather on air transportation safety and efficiency.



**Target: Conduct testing of Simulated Cold Soaked Fuel Frost for both Aluminum and Composite Wing Surface Models**

Complete testing of simulated cold soaked fuel frost (CSFF) in Baylor University Climatic and Aviation Frost Facility (CAFF) for both aluminum and composite wing surface models. Finalize and provide a database CSFF thickness and roughness evolution, a thermodynamic prediction analytical model for frost evolution, and a draft final report.

**Target: Conduct Aerodynamic Wind Tunnel Testing on an Iced Swept-wing Model at Wichita St. University Walter H. Beech Wind Tunnel**

Complete a two-week wind tunnel test campaign to determine how ice accretions affect 3D swept-wing aerodynamics, based on laser-scanned ice shapes from supercooled large droplet (SLD) tests in the Icing Research Tunnel at NASA Glenn.

**Activity: Aviation Weather Research Program**

The Aviation Weather Research Program performs applied weather research addressing the need to advance the state of weather forecast and diagnosis information such that it can be exploited for integration into Air Traffic Management decision-support processes. Hazardous weather phenomena such as turbulence, inflight icing, thunderstorms, and low ceilings and visibility undergo research in order to forecast the timing and intensity of these conditions better, or to mitigate the impacts of these conditions on the NAS. The new Rapid Refresh Forecast System being developed by NOAA and partially funded by the FAA will undergo validation testing for aviation purposes. A fast-time, ultra-high resolution model on the order of a few meters will be tested to evaluate the effects of a range of weather conditions and hazards on UAS/UAM operations using the Raleigh, NC area as a model. In addition, a Safety Risk Management panel will be convened to assess the benefits of adding a capability to estimate visibility using automated methods to the FAA Weather Camera operational website.

**Target: Report validating running of experimental Rapid Refresh Forecast System (RRFS)**

Report validating running of experimental Rapid Refresh Forecast System (RRFS) deterministic and ensemble weather forecast model output in near real-time for determination of final configuration in preparation of National Weather Service FY23 operational implementation.

**Target: Safety Risk Management Report**

Safety Risk Management Report assessing the feasibility and benefits of adding the Visibility Estimation through Image Analytics (VEIA) estimated visibility to the Weather Camera operational website.

**Target: Report from completed study on the development and capability of a fast-time, urban micro-scale weather model**

Report from completed study on the development and capability of a fast-time, urban micro-scale weather model to objectively evaluate a range of weather conditions and potential severity of weather hazards specific to candidate UAS/UAM operations.

### **Activity: Weather Technology in the Cockpit**

Address the need for enhanced cockpit weather technology, information, and human factors principals to achieve objectives of improved aviation operational efficiency and safety, reduced flight delays, and reduced gaseous emissions in or due to adverse weather.

#### **Target: Report on the effectiveness of using inverse modeling capabilities to produce an estimated power spectrum**

Report highlighting how the effectiveness of using inverse modeling capabilities to produce an estimated power spectrum of the vertical rate information capabilities will support development of innovative adaptive filtering techniques for improving the quality of the ADS-B turbulence algorithms.

#### **Target: Report defining the recommended output rate for the supplementary visibility information**

Report defining the recommended output rate for the supplementary visibility information provided by the prototype crowd sourcing architecture.

#### **Target: Report identifying the potential to create meaningful seasonal categories for a cockpit decision support tool**

Report identifying the potential to create meaningful seasonal categories for a cockpit decision support tool to determine the most likely approved weather source representative of the non-collocated region based on the seasonal category

### **Initiative: NextGen**

Support National Airspace System (NAS) modernization and evolution through infrastructure improvements, technology, information sharing, and community engagement.

### **Activity: Florida Metroplex Program**

The final Metroplex Program's project out of 11, is the only active project site. It will be completing its Post-implementation Phase. The Post-Implementation Phase includes the hand-off of the project site to the ATO Regional Service Center and an analysis of the implemented airspace and procedure changes to determine whether the changes resulted in the anticipated benefits and operational effectiveness. Upon completion of the Florida Metroplex project, the Metroplex Program will be completed and closed out.

#### **Target: Complete the Florida Metroplex Project Closeout Memo**

The Project Closeout Letter is a coordinated memorandum by the Project Manager and Program Manager stating that planned project activities have been completed. The project closeout letter informs the affected FAA facilities and associated Service Center of the completion as well as identifies any remaining actions to be accomplished by the Metroplex facilities

#### **Target: Complete the Florida Metroplex Post**

ImplementationBenefitsAnalysisFinalReport. This document is an analysis of the effectiveness of the airspace changes for the Florida Metroplex project. It will also detail any operational impacts and any required modifications

### **Target: Complete the Metroplex Program Closeout Memo**

This memorandum documents the execution and completion of all the Metroplex Program project sites and associated deliverables as well as the submission to the ANG-C5 programs repository of all the required documentation upon program completion

### **Activity: Established on Required Navigation Performance**

Established on Required Navigation Performance (EoR) utilizes the accuracy of Required Navigation Performance (RNP) instrument approach procedures (IAPs) to call aircraft established earlier in the final approach. Once aircraft are established, standard separation of 3NM lateral or 1000ft vertical no longer needs to be maintained. During this Fiscal Year, the project will work on Concept Validation at Los Angeles International Airport (LAX), developing a strategy for upcoming safety analyses, and gather information on Simultaneous Dependent Operations candidate facilities that could potentially utilize EoR.

### **Target: Concept Validation data at Los Angeles International Airport (LAX)**

Collect 12 months of Concept Validation data at Los Angeles International Airport (LAX) to inform Pure Duals Concept Validation.

### **Target: Performance Based Navigation (PBN) Safety Analysis Strategy White Paper**

Complete Performance Based Navigation (PBN) Safety Analysis Strategy White Paper.

### **Target: Established on Required Navigation Performance (EoR) Simultaneous Dependent Operations Survey White Paper**

Complete Performance Based Navigation (PBN) Safety Analysis Strategy White Paper

### **Activity: Trajectory Modeling Process Improvement**

Investigate the application of emerging technologies such as machine learning (ML), artificial intelligence (AI), and/or data analytics to propose an approach for obtaining input parameters in trajectory modeling that are flexible and require minimal approximation and substitution, as well as inferring or projecting mode of flight to improve accuracy of trajectory modeling in systems such as Time-Based Flow Management (TBFM).

### **Target: Deliver a report that surveys TBFM trajectory modeling data flows**

Deliver a report that surveys TBFM trajectory modeling data flows and provide an initial prioritization for any areas of improvement in trajectory modeling that would be best suited to a data analytics/ML/AI application.

### **Target: Trajectory Modeling Process Improvement**

Deliver a document outlining the steps for tailoring and cleaning data for selected trajectory modeling improvements, as well as any preliminary considerations in terms of data suitability. Types of proposed analysis will be included, as well as preliminary considerations and anticipated challenges for algorithm development

### **Target: Deliver a report documenting NASA's application**

Deliver a report documenting NASA's application of industry best practices to prepare the data for the algorithm parsing and machine learning with the goal of minimizing manual processing. This report will document all steps taken to prepare for analysis and propose any methods by which the reparation and pre-processing of the data can be made into a repeatable process

### **Activity: Multiple Airport Route Separation**

Multiple Airport Route Separation (MARS) leverages is the Established on Required Navigation Performance (EoR) concept of considering aircraft established on a Performance Based Navigation (PBN) procedure and extends it to flows of traffic to and from multiple airports in close proximity. During this Fiscal Year, the project will work on a preliminary Benefits Analysis, the MARS Phase I safety analysis, and begin to develop a MARS Concept Video.

### **Target: Complete MARS Benefits Analysis**

Complete MARS Benefits Analysis

### **Target: Update MARS Phase I Human-In-The-Loop (HITL) Test Plan with post-COVID information**

Update MARS Phase I Human-In-The-Loop (HITL) Test Plan with post-COVID information

### **Target: Complete MARS Video Script**

Complete MARS Video Script

### **Activity: Separation Automation System Engineering**

Separation Automation System Engineering (SASE) is a pre-implementation program that matures emerging NextGen Separation Management capabilities and develops automation enhancements for En Route, Terminal, and Oceanic domains to support NextGen. Separation Services Engineering (SSE) is a sub project within SASE and focuses on the emerging 2035 Vision. The team will continue to support the necessary update and coordination with the applicable program management office for En Route Automation Modernization (ERAM) Enhancement 3 (EE3) Investment Analysis Readiness Decision (IARD). In accordance with the goals of the future vision that seeks to leverage technological advancements and agile services, the FY21 effort will evaluate the feasibility of developing separation functions as independent services that can be tailored across multiple ATC domains and automation systems in a diverse ATM environment. The project will pursue the application of innovative technologies for separation management that include Artificial Intelligence (AI), Machine Learning (ML) and speech recognition. ATC Reimagined Immersive Experience Solution (ARIES) will allow air traffic controllers to safely manage larger traffic volumes including new entrants to the airspace in an integrated information environment.

### **Target: Conflict Probe Service Analysis Report.**

This report will perform a technical analysis to evaluate the potential for deploying En Route Automation Modernization (ERAM) Conflict Probe (CP) function as an independent service that could be potentially applied to different domains. This task will assess the technical opportunities, alternatives, and functional requirements to support CP function, and provide recommendations for future work.

### **Target: Application of Artificial Intelligence (AI)/Machine Learning (ML) to Separation Management.**

This report will address the application of AI/ML technologies to National Air Space (NAS) separation automation systems. The topics to be addressed include various levels of controller oversight vs. automation in the application of AI/ML to separation automation – e.g., from Human-In-The-Loop (HITL) AI/ML support in which the controller approves all decisions, to a Human-On-The-Loop (HOTL) role of monitoring the automation with an intervention capability. Other areas to be addressed include controller/automation analysis of how the controller is kept engaged based on the confidence with the level of automation and mechanisms to gain the controller's confidence, and to provide contingencies in case of automation failure/degradation. The task will evaluate ongoing developments and potential application of AI/ML technologies to separation automation, both within the U.S. and International Airspace Service Providers (ASPs).

### **Target: Application of Automated Speech Recognition to Separation Management.**

This task will complete a report to address the application of automated speech recognition technologies to NAS separation automation systems. The task will evaluate ongoing developments and potential application of automated speech recognition technologies for separation automation, both within the U.S. and International Airspace Service Providers (ASPs). The deliverable will capture the outcomes of this analysis and provide recommendations for future work.

### **Activity: Flow Object**

Today's NAS has many exchanges of flow information, but there is no common reference for how that information is shared. Without a common picture of the flow domain, it will be difficult to modernize components of the National Airspace System (NAS) or to enable future technologies and information exchanges. The Flow Information Exchange Model (FLXM) supports information exchange for the Flow domain. A "Flow Object" concept developed in this project will represent a common reference for Flow information.

#### **Target: Flow Object initial concept definition**

Complete Flow Object initial concept definition to spell out the scope of the Flow Object concept, as well as underlying assumptions

#### **Target: Complete Flow Object initial requirements document**

Flow Object notional capabilities will be broken into underlying functions, which will be used to define initial functional requirements.

#### **Target: Complete Flow Object initial use cases**

The use cases will be used to describe the as-is state of NAS operations and data with the Flow Object concept

### **Activity: Flight Object**

This program further mature the Flight Object concept, which provide a common reference to flight information in the National Airspace System (NAS). This program also develop a collection of services and verify their capabilities through proof of concept activity. These services can be implemented in the future flight information management system to enable future flight plan filing, flight planning, and collaborative sharing of flight information.

#### **Target: Flight Object Data Store and supported Data Model**

Complete Proof of Concept#3 which includes the updates to current Flight Object Data Store and supported Data Model, interface with NAS Common Reference (NCR) for flight specific constraints, and support flight plan submission in mixed mode environment (i.e. flight plan in today's format and flight plan in Flight Information Exchange Model or FIXM format).

#### **Target: Deploy the Flight Object application and services in FAA Cloud Services (FCS) environment.**

The initial deployment will include matured services based on the Flight Object Proof of Concept#2. The integration with this FCS Flight Object will be validated by conducting interface test from the Florida Test Bed (FTB).

#### **Target: Deliver Flight Object Proof of Concept#3 Technical Transfer Package**

Deliver Flight Object Proof of Concept#3 Technical Transfer Package to AJM which will include software application code, application interface documents, data flow diagrams, and demonstration final report..

### **Activity: Information Management**

Information Management (IM) is performing engineering analysis on the information infrastructure to address future requirements for information management systems and national airspace system (NAS) architectures. IM will merge the information sharing needs with additional requirements from upcoming NextGen initiatives and capabilities.

#### **Target: Complete draft candidate microservice suitability assessment.**

Complete draft candidate microservice suitability assessment.

#### **Target: Complete Final candidate microservice suitability assessment**

Complete Final candidate microservice suitability assessment

#### **Target: Complete investigation report into barriers to mass cloud migration**

Complete additional analysis of Microservices and Cloud component considerations for deployment

### **Activity: Dynamic Routes for Arrivals in Weather (DRAW) Human in the Loop Simulation (HITL)**

Dynamic Routes for Arrivals in Weather (DRAW) is a trajectory-based decision support tool for traffic managers aimed at improving arrival traffic flow. In FY22, the DRAW prototype will be evaluated in the extended metering and couple scheduling environments.



**Target: Complete DRAW HITL**

Complete DRAW HITL

**Target: Complete DRAW HITL Report**

Complete DRAW HITL Report

**Activity: Closely Space Parallel Operations**

CSPO explores concepts to increase airport capacity through reduced separation standards, expand applications of dependent and independent operations, and enable operations in lower visibility conditions. These improvements will develop and refine procedures that enable operations for closely spaced parallel runways (CSPRs) spaced less than 4300 feet laterally.

**Target: Complete Full Safety Study for Reductions in Minimum Radar Separation.**

Complete Full Safety Study for Reductions in Minimum Radar Separation.

**Target: Complete Site Assessment for Integrated Arrival And Departure Operations concept**

Complete Site Assessment for Integrated Arrival And Departure Operations concept

**Target: Develop preliminary artifacts to support Safety Risk Management (SRM) documents and Document Change Proposal(s) (DCP) for the Integrated Arrivals and Departures Operations concept**

Develop preliminary artifacts to support Safety Risk Management (SRM) documents and Document Change Proposal(s) (DCP) for the Integrated Arrivals and Departures Operations concept.

**Activity: Common Support Services Flight Data: The Common Support Services**

The Common Support Services - Flight Data (CSS-FD) program will enhance flight planning and filing capabilities, and provide enterprise-level services that support flexible, accurate, and timely access to common flight information across domains, flight operators, and the Air Traffic Management (ATM) community, via a new information exchange environment. The CSS-FD program is scheduled to reach its Initial Investment Decision (IID) milestone by FY-2022 Q2.

**Target: Business Case document support of CSS-FD**

Complete in Initial Business Case document support of CSS-FD Initial Investment Decision (IID) in FY-22

**Target: Complete the Risk Reduction Activity (RRA)**

Complete the Risk Reduction Activity (RRA) Requirements and Use Cases Package for Sprint 2



### **Target: Initial Implementation Strategy and Planning Document (ISPD)**

Complete the Initial Implementation Strategy and Planning Document (ISPD) in support of CSS-FD Initial Investment Decision (IID) in FY-22

### **Activity: Digital Twin Formulation**

Explore the concept of digital twins, complete the initial planning phase and concept development for a digital twin prototype that explores the application of digital twins to NextGen concepts and NAS systems.

### **Target: Deliver a project schedule and all checkpoints**

Deliver a project schedule and all checkpoints associated with work to be completed in Year 1 of digital twin application in the NAS. The document will indicate sources for data culling and highlight the pathway for development of the use cases.

### **Target: Deliver a report of at least two use cases and establish the methodology**

Deliver a report of at least two use cases and establish the methodology of how the digital twin will be built for these uses. Specifically, this report will establish what the digital twins will represent and how will they be used to benefit the NAS, and further solidify the process for architecture development and execution of a prototype.

### **Target: Deliver a draft architecture for the selected digital twin prototype**

This deliverable will also document the use of the cloud environment, what the pipeline looks like, the origin and use of the data, how that data will be collected, and any other information pertinent to the development of the digital twin prototype

### **Activity: Notice to Airmen Aircraft Category Information**

Conduct additional analysis and develop strategies for additional updates to the NOTAM operating environment and apply modern techniques to support future capabilities.

### **Target: Draft report on initial data analytics**

Draft report on initial data analytics, experimentation process, and findings for year 2 of work. Document the results of initial NOTAM analysis for year 2, including indication of how the clustering and trend identification work, as well as the predictive input exercise completed in year 1 were leveraged. It will also detail strategy for any development work.

### **Target: Final Report on year 2 NOTAM data analytics**

Document the results of the second year of NOTAM analysis, including approach, findings and conclusions, recommendations for future improvements, and lessons learned.

### **Target: Develop an update to the NextGen NOTAM Modernization Concept**

Develop an update to the NextGen NOTAM Modernization Concept of Use originally developed in FY2020. This will include a review of the document, incorporation of stakeholder feedback, an analysis on system challenges faced by the current NOTAM system, and advances made to new operating platforms, as well as needed updates to use cases and the process used for updates.

### **Activity: ANG Support of Runway Safety Technology Program Management Integration**

The Runway Incursion Reduction Program's (RIRP) objective is to continually discover, research, implement, maintain and innovate technologies that will detect the incorrect presence of an object in the Runway Safety Area and deliver a directive cue to the individual who can take corrective action.

#### **Target: Runway Incursion Reduction Program (RIRP)**

Runway Incursion Reduction Program (RIRP) will initiate installation of a Runway Incursion Prevention through Situational Awareness (RIPSA) technology at one identified candidate test site.

#### **Target: Runway Incursion Reduction Program (RIRP) will conduct lab demonstration**

Runway Incursion Reduction Program (RIRP) will conduct lab demonstration/testing of simultaneous use of Surface Taxi Conformance Monitoring (STCM) tower and flight deck prototypes.

#### **Target: Runway Incursion Reduction Program (RIRP) will deliver programmatic support to AJI**

Runway Incursion Reduction Program (RIRP) will deliver programmatic support to AJI as required for the Surface Safety Group (SSG), Data Analysis Team (DAT), and Surface Safety Initiatives Team (SSIT).

### **Activity: Flow Information Exchange Model (FLXM)**

The Flow Information Exchange Model (FLXM) is a new standard proposed by the FAA for Air Traffic Flow Management (ATFM) information exchange in support of the broader effort to implement enterprise-wide information exchange standards. The goal is to provide a standard for information in the Flow Domain, which has not previously had a standard of its own. The Flow Domain consists of information that describes a Traffic Management Initiative (TMI), or information that exists directly because of it.

#### **Target: Complete Flow Information Exchange Model (FLXM) Release 2 (R2) Package**

The release package contains the newly modeled Traffic Management Initiatives (TMIs) as well as logical model and schema.

#### **Target: Complete Flow information exchange Roadmap.**

This roadmap outlines flow information needs and stakeholders, and proposes a timeline to incorporate all flow needs.

#### **Target: Complete the Flow Information Exchange Governance Plan**

This plan will describes the rules governing the Flow Information Exchange Model, with topics such as versioning, change control, and interoperability

### **Activity: Facility Letter of Agreement Data Analytics**

Conduct additional analysis and develop strategies for a standardized digital template used in information exchange, for platforms and services such as Letters of Agreement (LOAs).

**Target: Document the results of the initial Letter of Agreement Data (LOA)**

Document the results of the initial Letter of Agreement Data (LOA) analysis for year 2 of work, as well as including experimentation, methodology, and approach for additional algorithm development.

**Target: Document the results of the second year of Letter of Agreement (LOA)**

Document the results of the second year of Letter of Agreement (LOA) analysis, including findings and conclusions, recommendations for future improvements, and lessons learned.

**Target: Complete Temporary Flight Restriction (TFR) Assistant Proof of Concept (PoC) exercise**

Document the historical analysis performed on the TFR data to identify the common data elements needed to create a schema and the most common TFR types. Include the development of a prototype to enter and process TFR requests against business rules. This final report will elucidate all work completed in the initial exercise and identify potential avenues for future proof of concept work

**Activity: Wake Turbulence Enhancement Of Arrivals And Departures Collaboration**

International working groups are looking at enhanced methods of providing wake turbulence mitigation utilizing currently available technology. ANG-C will lead the development of wake turbulence mitigation separation standards, procedures, processes, and enabling technology research for near, mid, and far term NextGen era operations. ANG-C will assess the performance of the wake turbulence separation processes and utilize those assessments in the design of new NextGen era operations. Team will perform analysis, modeling, concept development, and data collection activities necessary to accomplish the NextGen Wake Turbulence research agenda.

**Target: Complete the final report for new aircraft type wake separation recommendations**

Complete the final report for new aircraft type wake separation recommendations delivered to the ATO for Boeing BT-7 Redhawk.

**Target: Complete white paper on validation of an absolute wake metric model**

Complete white paper on validation of an absolute wake metric model for use in enroute and terminal airspace, specifically in airspace where a relative assessment is not feasible.

**Target: Complete white paper on Dynamic Wake Proof of Concept**

Complete white paper on Dynamic Wake Proof of Concept activity to validate the concept in operational scenarios